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OPERATING UPON THE POSTERIOR FACE OF THE STOMACH BY THE INTER-COLO-EPIPLOIC ROUTE.

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Lardennois and Okinczyc some three years ago demonstrated the feasibility and advisability of exposing the posterior face of the stomach for total colectomy, and my esteemed friend and colleague, Professor V. Pauchet, finding that by their procedure, hereinafter described, he could largely expose not only the posterior face of the stomach, but also the duodenum and pancreas, has practically adopted it for all gastric operations, and especially for the repair of gun-shot wounds.

The procedure recommends itself by absence of hemorrhage and ease of accomplishment, and I believe it will meet the general approval of those surgeons who become acquainted with its technic.

Since the beginning of the present war the discussion has not ceased as to the advisability of surgical intervention in wounds of the abdomen, and I am one of those who has fixed, as the requisites for such intervention, five essentials: a good operator, aided by a good assistant, with good and proper surgical materials and appliances, in a good, safe location and surroundings, and unhurried time in which to operate. Lacking these elements, abstain from operative intervention.

For perforating wounds of the stomach, where it is necessary to reach the posterior face, the operator has the choice of four routes.

1. *By the gastro-hepatic route.*—The lesser omentum is pierced by the index finger at the border of the curvature permitting the finger to explore the posterior gastric aspect: a narrow and blind procedure.

2. *By the transmesocolic route.*—The ordinary choice where the surgeon desires to perform a posterior gastro-enterostomy.

At a level of one of the vascular arcades of the mesocolon an opening is made, affording access to the posterior face of the stomach. This route is easy but circumscribed.

3. *The colo-gastric route.*—This consists in cutting the colo-gastric ligament at the border of the greater curvature and separating the transverse colon from the stomach. The stomach is lifted up, freed from the great omentum, which remains adherent to the transverse colon, which is pushed down with its mesentery.

This maneuver gives an open field, but is more or less slow, as it requires a number of ligatures.

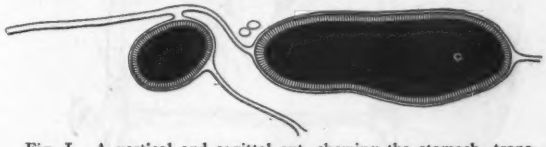

Fig. I. A vertical and sagittal cut, showing the stomach, transverse colon, the mesocolon and great omentum, which is loosely adherent and without blood-vessels at its insertion to the transverse colon.

4. *The new method of Lardennois, Okinczyc and Pauchet,* to the description of which this paper is now devoted, is incomparably superior to the others, being easy, rapid and benign: it has been named epiplo-enterocolic and consists of separating the greater omentum with its mesentery, from the transverse colon.

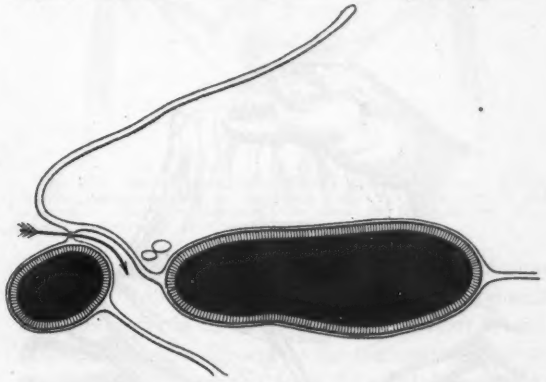

Fig. I-A. Shows the manner of lifting the great omentum and the point at which it should be separated from the transverse colon, without hemorrhage.

By reference to the schematic figures I, I-A, and II, representing the greater omentum, stomach and transverse colon, with its mesentery, the reader will see how the posterior aspect of the stomach is exposed in its entirety, with free access to the epiploic cavity.

The technic of the procedure is simple, but requires care in manipulation.

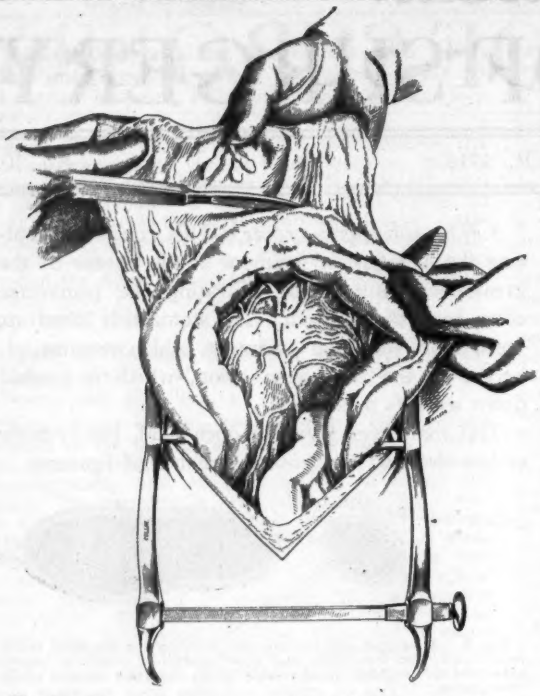

Fig. II. The abdomen is opened and held so by the retractors of Gosset, the epiploic insertion into the transverse colon is being separated by the point of the bistoury.

Fig. IV. The great omentum completely separated from the transverse colon, is lifted up with the stomach, when a wound of the posterior face can be easily repaired. The pancreas is shown between the stomach and transverse colon. The duodenum is brought into view at the pyloris end.

Fig. III. The intercolo-epiploic incision once started by the bistoury is continued by aid of a tampon of gauze mounted upon the forceps, along the black line. When the great omentum is completely separated from the transverse colon, it is lifted up, and with it the stomach.

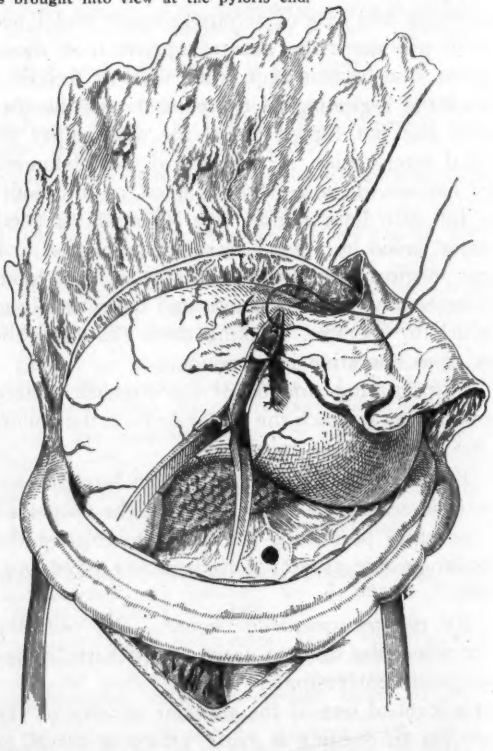

Fig. V. Shows the reinforcement of the repaired gunshot wound, by a fold of the omentum. The remainder of the great omentum is pushed into the posterior epiploic cavity. The transverse colon is sutured directly to the great curvature of the stomach at the line of insertion of the great omentum.

After opening the abdominal cavity, with the point of the bistoury, scratch an opening in the serous membrane of the transverse colon at its juncture with the greater omentum, then with a tampon of gauze mounted upon a forceps, gradually separate the one from the other (fig. III) the full length of the insertion; this should be done without tearing and will prove to be free from all hemorrhage. By lifting up the apron of the omentum thus freed, the posterior face of the stomach comes into full view, as well as the pancreas and duodenum, as the transverse meso-colon with its vascular arcades is pushed downward.

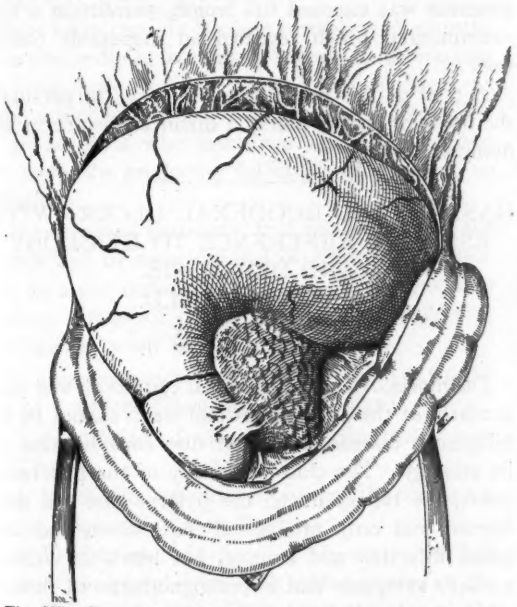

Fig. VI. Shows an ulcer of the duodenum, adherent to the pancreas, not recognized in an exploration of the anterior surface of the stomach, made perfectly visible after the intercolo-epiploic separation.

The operator who avails himself once of this route will frequently practice it in a variety of conditions.

1. *Exploration of the stomach and duodenum.*—Professor Pauchet, in a recent communication,* said: "Formerly when I operated upon a subject supposed to be suffering some gastric trouble, I opened the abdomen, examined the pylorus and anterior aspect of the small curvature of the stomach, and if my fingers and eyes found nothing, I concluded there was an error of diagnosis, and I missed the real trouble."

"Since I have practiced the intero-colo-epiploic separation, it frequently occurs that I find by exploring the posterior face of the stomach, an ulcer there or of the duodenum, which might otherwise have remained hidden." (fig. VI.)

2. *For gun-shot wounds.*—The wound of the anterior face of the stomach is found and sutured: then the operator opens into the posterior cavity by the intero-colo-epiploic separation, finds and fixes the posterior wound by a Volsellum forceps, or by two sustaining threads, in order to close the opening by four separated sutures, after which the free border of the omentum is sutured to reinforce the repair. (figs. IV, V.)

The posterior epiploic cavity is carefully swabbed

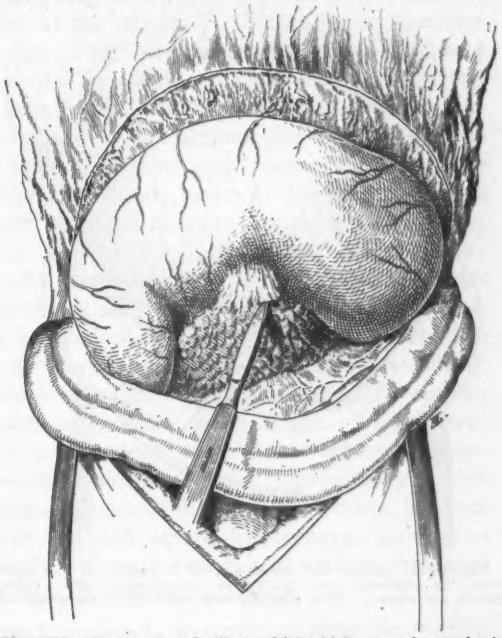

Fig. VII. Shows the facility with which an ulcer of the smaller curvature can be separated from its adherence to the pancreas. After its liberation, the ulcer can be resected, or a partial gastrectomy can be performed.

out with a tampon, wet with warm saline solution or ether; the greater omentum is then introduced into this cavity in its entirety and the inferior border of the stomach is sutured to the transverse colon at the line of its separation from the epiploic insertion. The greater omentum thus abandoned in the posterior cavity acts in phagacytosis and replaces drainage.

3. *Ulcers of the lesser curvature and posterior face of the stomach.*—Gastric ulcers repair best if they are resected. Resection is easy if the ulcer is located at the level of the pylorus. They are more delicate and difficult if they occur upon the lesser curvature or posterior gastric face, and especially so if found high up near the cardiac opening.

By this new route, it is comparatively easy to find the hidden ulcer, and it is a boon to the surgeon

* Bulletins et mémoires de la Société de Chirurgie de Paris, May 10, 1916.

when inflammatory adhesions must be separated. The ulcer once liberated can be resected, but if the surrounding surfaces are much inflamed, it is better to perform a partial gastrectomy, which will be found to be less grave and more efficacious.

4. *Dissection for cancer of the pylorus.*—The diagnosis once made and the surgeon once in the midst of an operation for this condition, should not substitute a gastro-enterostomy for a radical operation, except he finds a metastasis of the peritoneum, or in the lumbar glands. Some operators decide upon a gastro-enterostomy when they find the tumor adherent to the pancreas: (fig. VII.) as this condition is almost constantly inflammatory, this substitution is to be regretted.

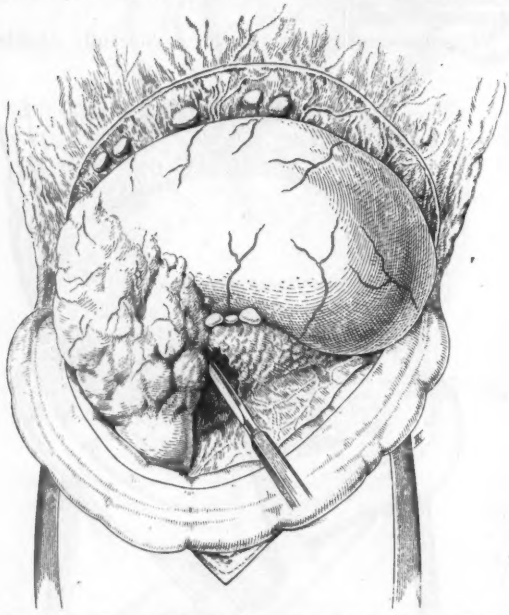

Fig. VIII. Shows the separation of a cancer of the pylorus from the pancreas and transverse meso-colon. The enlarged glands are shown. This drawing was made from an actual case.

By systematically practicing the intercolo-epiploic separation in the presence of cancer of the pylorus, the surgeon arrives directly upon the tumor and can separate it from its adhesions with a facility equal to an organ superficially located in the abdomen. If pancreatic adhesions exist, they cannot only be separated under the eye, but the colica media artery can be more readily recognized and protected. (fig. VIII.)

By this route, the liberation of the stomach and the tumor, constituting the first period of the operation, is greatly facilitated, and the stomach, freed from its colic and mesocolic attachments, can be freely lifted, affording an open field in which to proceed with the succeeding steps of the operation.

5. *Operations upon the pancreas.*—By this route the pancreas is laid open to its full length. I saw Professor Pauchet operate upon a patient in the service of Dr. Walther in La Pitié Hospital, where the diagnosis of a tumor of the pancreas had been made by the Chef de Clinique and Professor Arrou.

By a double paravertebral injection of novacain-epinephrin, Corbière, producing complete anesthesia of the epigastrium and the visceral contents, he was enabled to perform a laparotomy without the aid of ether or chloroform, and with complete absence of pain to the patient.

After making the colo-epiploic separation, the pancreas was exposed full length, permitting a full examination, which revealed an inoperable condition.

A trial of this new route will serve to persuade the operator that it marks a distinct advance in abdominal surgery.

GASTRIC AND DUODENAL ULCER: WITH ESPECIAL REFERENCE TO ETIOLOGY AND DIAGNOSIS.

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Diagnosis of any pathological condition, and particularly of the gastro-intestinal tract, cannot be intelligently discussed without due consideration of its etiology. The close proximity of the pancreatic ducts, the biliary ducts, the pylorus and the duodenum, not only predispose these tissues to frequent infection and trauma, but leave us without a *single* symptom that is pathognomonic of disease of any one.

Lesions of the stomach and duodenum do *not* consist of the large number of ulcers that we have been led to believe the past few years. In this section of the country especially, ulcers of the stomach and duodenum form a comparatively small percentage of the digestive disturbances we encounter, in contradistinction to the teachings and writings of many capable men the past five years. Where ulcer *does* exist, and I say it without reservation, it is *not a disease* but a symptom. A symptom of what, one may ask? I would say a symptom of any condition that will produce pyloric obstruction, organically or spasmodically, and this condition may be present in the pancreas, in the appendix, in the colon, the prostate, the teeth, gums, nasal sinuses, in the blood stream itself, and last and probably of greatest frequency, in the liver and its adnexa. Experimental ulcer has been recently produced in the following ways:[1]

(1) By section of the spinal cord, and after that, introducing strong HCl. into the stomach (Koch and Ewald);

(2) By trauma and thermic irritation (Ritter and Decker);

(3) By producing hemaglobinuria (Silberman);

(4) By bleeding animals to severe anemia (Quincke);

(5) By injecting an emulsion of wax particles into central portion of the femoral artery (Pannum);

(6) By injecting a suspension of chromate of lead into the splenic or gastric interior (O. Cohnheim).

These are all proofs of ulcer formation in animals, but undoubtedly in man many superficial ulcerations occur which do not develop into typical ulcers, as demonstrated by the hemorrhagic areas in alcoholics, and in acrobats who introduce sharp bodies into their stomachs producing follicular swelling but no ulcerations.

It would seem, therefore, that factors outside the stomach and of constitutional origin must be causative, in some instances at least, in the production of ulcer. In proof of this we have the following experimental work to support us:[1]

(1) Demonstration of bacteria in colonies on the floor of the ulcer (Boetcher and Latulae);

(2) Production of ulcer by injecting colon bacilli (Turck);

(3) Production of ulcer by cutting the vagus below the diaphragm (Von Yzeran);

(4) Production of ulcer by ligating the left branch of the portal vein—due to disfunction of the liver. Of course, in addition local atrophy of the liver occurred. From this it was concluded that normally there are toxic substances formed which are rendered non-poisonous by the normal functionating liver. If the liver cells are diseased this disintoxication cannot be accomplished. The fact that through injection of liver extract ulcus ventriculi or intestinal bleeding may be produced, is proof of the toxic influence of the dead liver cells (Gunderman). Many attribute ulcer to disease outside of the stomach (chronic appendicitis, gall bladder disease, chronic obstipation), which by way of visceral nerves causes contractions of the musculature of the stomach, thus leading to ischemia and ulcer formation, and also hemorrhages of small vessels.

While there remains a difference of opinion as to how ulcer is produced, in the main all agree that in order to have ulcer produced occlusion of the local blood supply with ischemia is necessary. That this condition may be brought about in a number of ways, a great variety of experimental work has proven. That this occlusion is a result of spastic contractions of the pylorus in many instance is proven by *x*-ray demonstration of pylorospasm, etc., and in an experimental way by Hamburger[2] in his recent work in constricting the pylorus to various degrees of obstruction. The question of auto-digestion after the lesion is once produced has been widely debated. It is known, however, that in addition to the pancreas, the stomach contains an active proteolytic enzyme which unrestrained is capable of destroying tissue where there is an impaired vitality of the mucosa. Whether or not the liver may also contain such an enzyme I have not heard discussed. The work of Gunderman, however, and the fact that by injecting liver extract ulcer can be produced, would account for many conditions that have heretofore gone unexplained. I refer particularly to those cases of gastric hemorrhage without further evidence of ulcer. We have had a few of these cases come to operation, and the only lesion shown was adhesions about the pylorus and duodenum, sufficient, however, to allow more or less backward flow of bile into the stomach under various conditions; and if, as seems possible, there is a proteolytic enzyme present, hemorrhage would follow. With a tendency to chronicity, ulcer would naturally ensue. I have three such cases under observation now, with not one symptom of digestive disturbance, but each patient has had severe hemorrhages coming on suddenly without warning, and without symptoms of gastric disturbance following.

The foregoing is presented to show the possible cause of ulcer, and to prove that there *is* a preulcer stage which in a majority of instances is medical, and that prophylaxis is of the very greatest importance in preventing ulcer formation. Comfortable existence in America (from the standpoint of finance) means hasty eating, overeating without consideration for quality, insufficient rest after meals, relaxation, both mental and physical, neglect of daily evacuation of the intestinal tract, etc. This in turn means hyperacidity, hypersecretion, weakening of the stomach muscles, and eventually ulcer through the process before mentioned. Once, however, ulcer is formed its presence should be determined early, and to do this it is necessary to avail ourselves of all the various diagnostic methods, and even then a large number of errors will result.

It was my privilege to study a series of 420 cases of ulcer of the stomach and duodenum prior to 1915. Many cases have since been studied and fol-

lowed through operation, but the statistics of later cases have not been compiled. Of the 420 cases in this series, there are certainly many diagnostic errors. However, those errors occurring after using all the various diagnostic methods are in a degree excusable.

In the study incident to the compilation of these statistics, I have been firmly convinced that an appreciation of the etiology and a proper interpretation of symptoms obtained, not from *one* method of diagnosis, but from *all,* is necessary before an intelligent line of treatment can be prescribed, either medically or surgically. That all ulcers of the stomach and duodenum do become surgical if not properly treated can admit of no doubt. That all ulcers which have become surgical have gone through a stage in which careful hygienic and dietetic measures would have effected a cure, thus obviating surgery, has equally impressed me. This being the case, there is a medical stage of ulcer which is extremely difficult of diagnosis, and is usually treated simply as "dyspepsia" or indigestion. On the other hand is the surgical stage in which the symptoms have persisted until the typical ulcer has developed, and medical measures are worse than useless because they do not cure, and the patient through a mistaken idea of temporary relief for permanent cure at least suffers one of the several sequelæ, the most frequent and serious of which is carcinoma. I would, therefore, urge earlier diagnosis of this condition, which, in a large percentage of cases, can be done with the necessary laboratory and *x*-ray aids.

Of the 425 cases here reported 277 were males and 148 females. The following table shows that more people were affected between the ages of thirty-five and fifty, but on account of the frequently long duration of ulcer I doubt the value of such statistics, since many patients above forty have had symptoms from ten to twenty years and just as properly belong to another period.

TABLE NO. 1.

Age: 10 to 20	8	1.8%
20 to 35	127	30%
35 to 50	208	49%
50 to 60	51	12%
Over 60	31	7.3%

Of this number 306 (72%) had lost weight (up to 50 lbs.), 107 (25%) had remained stationary, and in 12 (2.9%) there was a gain of weight; 269 (63.3%) appeared healthy, and 156 (36.7%) were sickly.

In support of the theory that infections play a part in the production of ulcer, table No. 2 will be found interesting:

TABLE NO. 2.

	No. of cases.	Occurrence of digestive disturbance.
Rheumatism	24 or 8%	Within two weeks
Throat infections	11 or 2.6%	"
Grippe	11 or 2.6%	"
Diarrhea	5 or 1.1%	"
Appendicitis	7 or 1.6%	"
Neuritis	2 or 0.5%	"
Puerperal fever	11 or 2.6%	"
Acute Nephritis	5 or 1.1%	"
Ptomaine poisoning	9 or 2.1%	"
Tenia	3 or 0.7%	Associated with
Diphtheria, yellow fever, septicemia, pancreatitis, gonorrhea, colitis, peritonitis, parotitis, cystitis, chorea, abscess (one each)	11	Immediately
Typhoid fever	22 or 5.2%	Two weeks to 30 years
Malaria	8 or 1.9%	Indefinite
Heart lesions	12 or 2.8%	"
Syphilis	9 or 2.1%	"
Pneumonia	5 or 1.1%	Immediately to 4 years
Tuberculosis	5 or 1.1%	Indefinite
Total	170 or 40%	Infections
Alcoholic	20	Immediately
Injury	8	"
Over-exertion	3	"
Operation (other conditions)	10	"
Nervous shock	3	
Foreign body, drugs, angina, diabetes (one each)	4	

As far as I was able to determine, the other cases started in with some digestive disturbance for which the patient could not account other than, in a majority of instances, by a heavy, indigestible meal. It seems quite reasonable where indigestion was the primary symptom, that a simple abrasion from dietary indiscretion was the beginning, and a subsequent infection was responsible for the ulcer. The metastatic infections from the streptococci occur within twenty-four to thirty-six hours, would indicate that those cases following throat infections, rheumatism, grippe, etc., were metastatic manifestations. Metastases from typhoid fever, pneumonia, tuberculosis, syphilis, etc., are very indefinite, and such is the case in this series. In connection with the valuable experimental work that has been done, to me the figures are at least significant. It might be interesting to note at this time that of the 425 cases, constipation was present 277 times (65+ %), and diarrhea but five times, a little more than 1%. Whether this is cause or result I am unable to say, but I believe it to be an etiological factor. In this series, as has often been pointed out by other observers, the most frequent time of occurrence is in the spring and fall. That organic lesions are rare in the asthenic habitus is evident from the fact that in the 425 cases the enteroptotic habitus was present in only 80 and the normal in 345 or over 81%. Indeed, I am of the opinion that what errors in diagnosis exist in this series would be found in the 80 cases of ptosis, in which the manifold symptoms of this condition are often quite similar to those of ulcer.

To my mind, one of the most forceful arguments against snapshot diagnoses is the number of cases

operated upon yearly for other conditions, and after which the symptoms persist. That a competent surgeon would not leave any pathologic condition in the abdomen is true, but the following table would indicate that all surgery is not competent:

TABLE NO. 3.

Operation.	Number	Results.
Appendicitis	12	No relief
Gall bladder drainage	6	"
Ovariotomy	3	"
Curettage	3	"
Gastro-enterostomy	1	"
Gastro-enterostomy	1	Partial relief
Perineorrhaphy	2	No relief
Duodenal ulcer	1	Partial relief
Hemorrhoids	3	No relief
Fixation of abdominal organs	1	"
Total	33	or more than 7.5%

A complete examination of these 33 cases left no reasonable doubt as to the probability of ulcer.

While the anamnesis is of the greatest importance in diagnosis, the foregoing table would indicate that it is not sufficient and the physician or surgeon who depends upon this alone is likely to fall into many errors. That diseases of the gall bladder, pancreas, appendix, etc., produce symptoms similar to those of gastric and duodenal ulcer we all know, and the anamnesis should do no more than in a general way to locate a pathological condition in the abdominal cavity. Just which organ is affected must be determined by other and more accurate diagnostic methods. It is the most important spoke in the diagnostic wheel, because if properly secured it tells us of the presence of trouble, but it does not locate it. In my series an attempt has been made to classify pain as far as possible. Distension from gas is classified separately and is the most constant of all symptoms, as it is also in gall bladder lesions:

Distension and pressure symptoms	368	or 86.6%
Pain not classified	78	
Gnawing	28	
Burning	125	
Cramping	20	
Sourness	91	

This makes a total of 251 cases, or 59%, that actually complained of pain. In 353, or 83%, belching was a constant symptom.

Symptoms occurring more than two hours after eating.	195	or 46%
Symptoms occurring less than two hours after eating.	147	or 34.6%
Symptoms occurring irregularly	49	or 11.5%
Symptoms occurring during the night also	70	or 16.5%
Relieved by eating in	208	or 49%
Aggravated by eating in	157	or 37%
Eating bore no relation in	60	or 14%

If the time of occurrence of symptoms after eating is an index to the location of the lesion, then we have in 195, or 46%, a probability of duodenal ulcer, and in 147, or 34%, a probability of gastric ulcer. While a fairly reliable index, it is by no means constant, and not comparable to other means for location of the lesion. Clinical observation proves that the time of pain depends upon a number of factors, size of the ulcer, quality and quantity of food, and whether one or the other ostium of the stomach is sympathetically involved in aggravating the pain. After a light meal, independent of the site of ulcer, pain occurs one or two hours later, and after a heavier meal three or four hours later.[1]

Just what significance food relief and food aggravation may have, I am unable to say. The general impression has been that by combining the free hydrochloric acid we thus remove the irritation, and the pain or distress is relieved. I have seen several cases which suffered pain, burning, etc., two or more hours after meals, and were promptly relieved by an alkaline powder, a cracker, or even water. There was occult blood in the stools, and all the roentgenograms showed distinct evidence of ulcer; yet the gastric analysis showed à total absence of free hydrochloric acid and the combined acid running about 10.

That pain is due to tugging on the parietal peritoneum, the result of peristaltic contraction to rid the stomach or duodenum of a lesion, is to my mind the most logical conclusion. The cervix of the uterus, the cervix of the gall bladder (or cystic duct), the cervix of the urinary bladder, etc., are all alike in this respect. A lesion at this point produces hypersecretion, painful contractures and tenesmus which are not present in other portions of the organ. In my experience ulcers of the greater curvature have not been accompanied by much pain, even when perforation has taken place, as has been demonstrated in two cases by surgery. Food relief is obtained for the same reason that vomiting is comparatively easy and painless, when there is plenty of contents to be evacuated. When this is accomplished, however, and the violent wrenching persists, the process becomes painful and annoying. Of much greater importance than the time pain appears is the presence of localized tenderness. In this series it was present in 344 cases, or 81%. While it is true that lesions of the pancreas, gall bladder, and appendages will give painful areas, their constant presence mean a pathological condition, and other methods must be employed to eliminate the unoffending organs.

Laboratory Methods: The chief value of gastric analysis is to afford an intelligent idea of proper dietetic treatment. As a diagnostic aid it is probably of some subsidiary importance, but in comparing analysis in 220 cases with a similar number of

analyses for other conditions, there is hardly sufficient difference to use this as a strong diagnostic guide. The total contents of the stomach (method of Mathieu) is probably of some significance in determining obstruction, but not as reliable as the raisin-meal or a residue six hours or more after the bismuth-buttermilk-meal. Occult blood in the gastric contents is valueless unless the tube is passed with great care and there has been little or no retching or gagging by the patient.

Appearances	Acidities:	Combined HCl.:
Bile stain 11=5%	Normal 43=1.5%	Above 10
Mucous 102=46%	Hyperchlorhydria 136=62%	146=66.4%
Vis. blood 19=8.6%	Subacid 25=11.4%	Below 10
Normal 93=42%	Achylia 16=7.2%	74=33.6%
Hyperchlorhydria	Free HCl above 50	
Occult Blood: 155=70.5%		Lactic Acid: 58=26.3%

Fecal analysis: The presence of occult blood in the feces is of great diagnostic importance, provided care be taken to eliminate those things from the diet known to cause a positive reaction. It should be remembered also that ulcers do not bleed continuously, and repeated tests should be made from day to day. Small bleeding hemorrhoids should, of course, be considered. In 77 examinations made, occult blood was found in 43, or 56%. This is not a fair estimate, however, since in many instances we do not have our patients under observation long enough to determine this point. Three tests are always used, the benzidin, guaiac, and aloin, the benzidin being much more delicate.

The urine was analyzed in all of the 425 cases. It is frequently valuable in making a differential diagnosis, but there is nothing to point to disease of the stomach or intestines notwithstanding all that has been said and written concerning indicanuria. The constant presence of bile in the urine is of course in favor of disturbed liver function. The Cammidge reaction has been the cause of our diagnosing a pancreatic lesion in several instances where without it we should have diagnosed ulcer. The trypsin test of both the stomach contents and feces after oil, is also a valuable aid to the diagnosis of pancreatic lesions.

Blood analysis: Friedman[3] claims that in duodenal ulcer polycythemia is frequent, and anemia rare; and the reverse true in gastric ulcer. A study of the blood in 77 cases does not conform with this, in fact there is nothing of value other than possibly a leucocytosis such as one would get from an active lesion located in the cervix of any organ where the blood supply, lymphatics, etc., are richest. I do believe, however, that a leucocytosis is an aid in localizing the lesion at the cervix of the organ. Just why the blood picture should vary here from similar lesions elsewhere, I am unable to see from a histological standpoint. The average hemoglobin in this series was 72.2%, and the average R. B. C. 4,600,650.

Friedman states a fact that he has noted in his observations without attempting to explain the reasons therefor. In support of my theory that the liver is responsible in many instances (if not all) for the production of ulcer of the duodenum, I should like to refer to the excellent scientific research work done by Paul D. Lamson[4] in the Pharmacological Laboratory of the Johns Hopkins University, of Baltimore, and reported in the *Journal of Pharmacology and Experimental Therapeutics* under the head of "The Rôle of the Liver in Acute Polycythemia." He shows that by injection of epinephrin in proportion of .9 mg. per kilo, that polycythemia is produced. Experiments were made to ascertain the part played by various organs in the production of polycythemia. This was done by removal of the organs where possible, and in other instances by "cutting off" the organ from the general circulation. The intestine, its mesentery and the omentum, the spleen, the pancreas, bone marrow, muscles, lungs, kidneys and skin were shown to have no control whatever over the production of polycythemia; when, however, the liver was "cut off" from the circulation, the polycythemia was immediately stopped or prevented after injection of epinephrin. The following is his summary verbatim:

(1) The red corpuscle content of the blood is a constantly varying quantity under physiological conditions;

(2) Certain new means have been found by which the red count may be rapidly and greatly increased;

(a) Lung emboli produced by the injection of corpuscles hardened with formaldehyde, or an inert powder, as lycopodium, or of oil;

(b) Emotional stimuli, as fright and rage;

(3) The polycythemia produced by the injection of epinephrin is due to the action of the liver alone;

(4) Ligature of the arterial blood supply to the liver excludes the production of polycythemia after the injection of epinephrin;

(5) Later release of this ligature allows the customary increase in number of red cells to take place without the further injection of epinephrin;

(6) The liver effects this increase in number of red cells by:

(a) A decrease in plasma volume, not sufficient to account for the entire increase in the number of red cells, however;

(b) By bringing into the circulation red cells which were not present before the production of polycythemia as shown by (1) their reduced size; (2) their reduced percentage hemoglobin content;

(7) These cells give none of the usual reaction of young cells. There is an absence of nucleated red cells, no change in the fragility of the corpuscles, and no increased metabolism of the red cells themselves, as shown by an increased rate of reduction;

(8) It is concluded that there is a mechanism for the regulation of the red corpuscle content of the blood;

(9) That the regulatory mechanism is under nervous control, reacting to lack of oxygen as a stimulus;

(10) That the adrenal glands play a part in this mechanism;

(11) That the liver is the organ which supplies the body with red cells to meet its acute demands.

What polycythemia is present in duodenal ulcer is therefore dependent upon the liver mechanism, and this proves conclusively to my mind that duodenal ulcer is dependent to a degree upon the liver for its production.

The chief value of the blood count is in differentiating medical from surgical conditions. I am convinced that this procedure is more often responsible for indicating the necessity of surgery than any other single diagnostic method. It is simple, consumes but little time, and if it were universally employed, I am sure would be the means of saving hundreds of lives every year.

Roentgen rays: The final step in the diagnosis, and the one of greatest importance to my mind, as far as the patient is concerned, is the examination with the roentgen rays. If an ulcer cannot be demonstrated in this manner, I do not believe that it is surgical. An ulcer that has advanced to the point where a defect is constantly shown on the radiogram, has involved more than one coat of the gastric mucosa and the time has passed for a complete restoration of tissue and normal function by medicinal or hygienic measures. It is the one absolute method by which we can differentiate a medical from a surgical ulcer. Even copious hemorrhage from the stomach and intestines is *not* a surgical indication, unless the roentgenogram shows a defect. I have had three such cases, in which the hemorrhage was almost fatal; but the recovery was complete, and no evidence remained of gastrointestinal disturbance. In one case a similar hemorrhage occurred almost eight years before, after a heavy meal. There were no symptoms before or after to indicate the presence of ulcer. I recall distinctly, in my service with Dr. Pick, of Berlin, seeing several pathological specimens of numerous varicosities of the venous plexus of the wall of the intestines, and some of them ruptured, producing hemorrhage. There were no varicosities elsewhere.

In our list of 425 cases, 83 have been studied on the fluoroscopic screen and radiographically after the bismuth-buttermilk-meal. A combination of the various methods have been used. We believe that a surgical lesion can always be demonstrated. An adhesion may be called an ulcer, and a pancreatitis may be called an ulcer, but they are surgical lesions nevertheless and the error is negligible so far as treatment is concerned. In the hands of a capable roentgenologist (and roentgenology is an extremely scientific art), I believe the information obtained is but little less reliable than that obtained from exploratory celiotomy. The absence of radiographic evidence of ulcer does not indicate the absence of ulcer by any means, but it surely indicates the presence of a medical and not a surgical condition. The indirect method as advocated by Carman in this country is valuable evidence in the diagnosis of medical ulcer. The following table is presented for study:

ROENTGENOLOGICAL FINDINGS, 83 CASES.

Filling defects (Stomach)	25
Incisura	4
Residue (6 hours)	38

Opening.				Patency.		
	Immediate.	Delayed.	Not Seen.	Free.	Obstr.	Gaping.
Pylorus	20	56	7	52	28	3

Position.				Form.		
Normal.	Vertical.	Oblique.	Transverse.	F. Hook.	T. Hook.	S. Horn.
30	41	10	2	42	27	14

Peristalsis.					Duodenal Cap.		
Normal.	Active.	Vigorous.	None.	Weak.	Regular.	Irregular.	Not Seen.
23	21	25	10	4	14	59	10

Tonus.			Size.			
Hyper.	Hypo.	Ortho.	Small.	Med.	Large.	Very Large.
20	15	48	1	31	33	18

Tender Points.						
Duodenal.	Pyloric.	Gall Bladder.	Epigastric.	Greater Curvature.	Lesser Curvature.	O.	McBurney's Point.
48	22	15	9	1	4	7	2

After all diagnostic methods have been employed, I am sorry to say that even then a very large percentage of errors will result. A few years ago the statement was published that covering a period of years at the Massachusetts General Hospital, the records of that institution showed that only thirty some odd per cent. of the cases admitted were properly diagnosed as proven at autopsy. Just think

of it, and this one of the greatest diagnostic institutions in the country! This should not only furnish us with much consolation, but should spur us on to greater efforts and more accurate methods.

In concluding, then, I would emphasize the following points particularly: There is sufficient evidence, both experimental and otherwise, to warrant the belief that the liver plays a very great part in the production of gastric and duodenal ulcer (the latter particularly) through its failure to render non-poisonous toxic substances which are formed there, due to disease of the liver cells themselves. The possibility also of a proteolytic enzyme which under certain conditions when unrestrained produces destruction of mucous surfaces. Mark this prediction, however, that in the near future a much closer relationship will develop between diseases of the liver and lesions about the pylorus and duodenum.

Let us not forget, either, that a differentiation between gastric and duodenal ulcer is most important, as opposed to the general belief. Gastric ulcers go on to scar formation and obstruction and frequently cancer, and duodenal ulcers usually to perforation,[1] so in the latter case if medical treatment is not quickly successful surgical treatment should be advised.

Finally, the medical treatment: This in the majority of instances concerns the pre-ulcer stage, and should be prophylactic. The people should be directed to partake of only two substantial meals daily, one in the morning, consisting of fruit, cereal, light coffee, bread and butter; only a light lunch at noontime, and the second chief meal at six o'clock, consisting of soups, plainly prepared fish or meats, fresh green vegetables, cooked fruits, and light puddings. Overeating and hasty eating is to be avoided.[1] Sufficient rest must be taken after meals. Both mental and physical relaxation is important, and daily evacuation of the intestinal contents is imperative.

This latter point suggests the subject of focal infection, without which in this day of fads no medical discussion is complete. Let me say, however, that all foci of infection should be vigorously sought and removed, regardless of any single lesion, for the effect on the general health. We have heard much recently about the teeth, tonsils, alveolar processes, etc., being responsible for practically every ailment under the sun, and as a result of this thousands of sound, useful teeth, and thousands of healthy tonsils are being sacrificed. The pendulum is swinging too far, and we are losing our common sense and judgment. We have been curing disease for hundreds of years and the only focus of infection removed was in the colon, and since the days of Hippocrates the cardinal principle of medicine has been elimination. Personally I do not believe that diseased teeth, tonsils, etc., are directly responsible for disease anywhere. Bad teeth are not primary in themselves; they depend upon faulty nutrition. A child with faulty digestion and suffering generally from malnutrition, is most likely to have bad teeth. The same rule applies to the adult. Good digestion and thorough elimination are conducive not only to good teeth, but to good health generally.

I think I can safely say that bad teeth, bad tonsils, etc., are the result of faulty nutrition, depending upon improper food, improper elimination, and improper absorption, brought about by primary derangement of the gastrointestinal tract; and is not this probably true of the other so-called "foci"? Are they primary? No matter from what infection we may suffer, the intestinal tract is called upon to do more work than any other organ of the body and must suffer. Remember that all of our waste matter, which is subject to all forms of bacterial life from within and without, passes through the colon. It is subject to irritants, to trauma, and to all forms of abuse. Then recall that the blood receives much of its nourishment through the same medium by the process of osmosis, and nature intended this supply to be pure. It does not require a very great stretch of the imagination to believe that impurities as well as bacteria enter the blood stream from the intestinal tract, and that infections of the teeth, tonsils, the alveoli, etc., *are not primary*, but on account of their construction and susceptibility are the first to suffer from an infectcion which arises primarily where? In that organ, which has two severely antagonistic rôles to play in the human economy—*the colon*.

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After resection of the sigmoid it is desirable to leave a tube in the bowel, passed up through the rectum before the abdomen is closed. If a piece of rubber dam is placed on each side of the gut and brought out through the wound it will provide a safe outlet in case of leakage.

CRANIAL FRACTURES.

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While the subject of fractures in other anatomic situations has been extensively studied and elaborated in surgical literature during the last year or two, little information of practical importance has been added to existing knowledge concerning fracture of the cranial bones. Casual search of available English literature of the present year (1916) reveals only three or four contributions of any consequence dealing with fractures of the cranium.

The skull has been described as "a superior expansion of the vertebral column, as if composed of four vertebræ the elementary parts of which are especially modified in form and size and almost immovably connected, for the reception of the brain and special organs of sense." The major portion of the cranium is composed of eight sections known anatomically as: (a) the occipital, (b) the two parietal, (c) the frontal, (d) the two temporal, (e) the sphenoid, and (f) the ethmoid bones, any one or more of which may be fractured by external violence provided it be of sufficient severity.

Regardless of the anatomic situation involved, cranial fractures according to their character and extent may be single or multiple, and are classified as: (a) linear, (b) fissured, (c) stellate, (d) depressed, (e) compound, (f) comminuted, and (g) perforative. Clinically they are divided into: (1) fractures of the vault, and (2) those of the base of the skull.

Fractures of the vault are usually the result of direct traumatism externally inflicted. The extent and character of the osseous damage will depend largely upon the anatomic location and the force and direction of the instrument inflicting the trauma, *e. g.*, a direct blow upon the skull with a hammer or other blunt weapon will produce injury of a character entirely different from that due to a fall with impingement of the head upon some solid object. Therefore, from the standpoint of both diagnosis and treatment, it is of the utmost importance to ascertain in every instance the manner in which the trauma was inflicted. Moreover, the anatomic facts must also be remembered: (a) that the cranial structure (excepting at the base) consists of two osseous layers, familiarly known as the outer and inner tables; (b) that fracture may involve either one or both these layers (in the mastoid and frontal regions, only); (c) that fracture of the inner without visible lesion of the outer table is not unknown. "The lines of fracture on the outside of a given skull are seldom any index as to what may be found on its inner surface."

It may be stated as a general proposition that as to causation basal fractures differ in no essential respect from those of the vault. Fractures of the base are much more frequent than hitherto believed, and a large percentage of vault fractures extend to the base; thus in an analysis of 470 cases Brun found basal and vault lesions associated in 75 per cent.; in Besley's series of 1,000 clinical cases such an association was recognized in only 33 per cent., "showing the difficulties of diagnosis of the exact location of the line of fracture." However, in seventy-four cases which came to necropsy both types were found associated in fifty-four, or 72.9 per cent.

Practically all the older and many modern surgical text-books contain the statement that vault fractures are exceedingly common in comparison with those of the base, an observation which is contrary to the clinical experience of most present-day surgeons. The multiplicity of motor driven vehicles, and the numerous accidents incident to the reckless manner of their operation, has caused a tremendous increase in the number of basal fractures. My experience in this respect may have been unique, but in nearly every head injury the result of automobile accident coming under my personal observation during the last few years, there has been fracture at the base of the skull. Some of the patients have recovered without operative intervention, others have been operated upon and recovered, still others have died without regaining consciousness. Thus it may be seen that while basal fractures may be legitimately considered as more serious than those involving the vault alone, the outcome with or without treatment is not invariably fatal as was formerly quite generally believed.

It is claimed by some observers that counter pressure from the atlas coincident with a blow upon the cranial summit, may cause extension of the line of fracture to the base of the skull and that the only way the basal lesion can be detected in such cases is by the employment of roëntgenography and fluoroscopy. According to Besley the present and accepted theories regarding the mechanism of the production of cranial fracture are based upon and embody two definite principles: (1) The inbending of the skull at the point of contact of the blow; (2) the bursting of the skull at a point some distance from the applied force.

The multitudinous and varied symptomatology of cranial fractures is so generally understood that repetition may appear supererogatory but brief out-

lines may be permissible. And in this connection it seems appropriate to reiterate the dictum that the damage sustained by the osseous structure, *per se*, is of comparatively slight consequence in comparison to the cerebral injury.

Both the general and the local symptoms depend largely for their origin upon the anatomic location involved and the extent of injury inflicted upon the cranial contents. Unconsciousness is usually noted immediately following the trauma, and may persist for minutes, hours or days; but as it does not invariably occur after severe injuries, and may follow slight trauma without fracture, its importance as a diagnostic sign in head injuries lies in ascertaining *when* it occurred, how long it lasted and, above all, whether it turned. Severe shock is an almost invariable concomitant. Delirium (even mania) may develop promptly, or may be a late manifestation; likewise headache may be present from the beginning, or be of subsequent development. Vertigo, nausea, vomiting, mental excitement, convulsions, local paralysis, choked disc, stupor, coma, temperature rise without corresponding change in pulse-rate and respiration, are among the manifestations usually observed. The increased intra-cranial pressure from extra-dural or subdural hemorrhage and cerebral edema will explain the development of the majority of the symptoms mentioned.

Obviously the purely focal signs depend entirely upon cerebral laceration or contusion, and hemorrhage with resulting edema and pressure. The artery from which bleeding most frequently occurs is the middle meningeal. In basal fractures free hemorrhage may be noted from the mouth, nose, ears, into the orbital cavity, etc. Spinal fluid may escape from the ears, and more rarely from the nose. In the series of 1,000 cases reported by Besley, blood and spinal fluid escaped from the ears in 316; free bleeding from the mouth and nose in 172; from the nose in 118; from the mouth alone in 53, making a total of 343. It occasionally happens, says Besley, that involvement of one of the cranial nerves may be the only sign present indicating fracture, and that the nerve most commonly injured is the sixth. In his series unilateral facial paralysis occurred thirteen times. The respirations showed nothing characteristic, ranging from 22 to 40, being higher in the fatal than non-fatal cases. The temperature curves were likewise unimportant; in patients who recovered the average was 100° F.; fatal cases, 102° F.; in seven the temperature was above 105° F., in two reaching 107° F. Protrusion of one eye occurred in nine cases. Patellar reflexes increased in 67, absent in 50; no change recorded in others. Babinski reflex observed in 55; Kernig sign in 8; general convulsions in 32; clonic convulsions of arm, 6; leg, 2; face, 7. Rigidity of legs in 29; of the neck, 29. Complete paralysis of facial muscles in 47; legs, 55; arms, 58.

The analysis made by Besley of the pulse-rate and pupillary changes appears sufficiently interesting and instructive to warrant interpolation verbatim:

TABLE 1.—ANALYSIS OF PULSE RATE IN ONE THOUSAND CASES.

Nature of Fracture.	Number of Cases	Average Pulse Rate
	6	50
	8	60
1. Fractures of the vault without depression, with recovery (average pulse rate 71)	14	70
	23	80
	18	90
	14	100 plus
	1	50
2. Fractures of vault without depression resulting fatally (average pulse rate 113)	1	60
	1	80
	1	90
	12	100 plus
	1	50
3. Fractures of vault with depression with recovery (average pulse rate 92)	8	60
	24	70
	39	80
	26	90
	51	100 plus
	2	40
4. Fractures of vault with depression terminating fatally (average pulse rate 116)	3	80
	1	90
	25	100 plus
	4	50
	16	60
5. Fractures of base with recovery (average pulse rate 81)	15	70
	21	80
	13	90
	10	100 plus
	1	14
	6	40
	2	50
6. Fractures of base with death (average pulse rate 105)	9	60
	17	70
	25	80
	22	90
	119	100 plus
	1	200

TABLE 2.—PUPILLARY CHANGES IN ONE THOUSAND CASES.

Pupillary Changes.	Side.	Number.	Average Per Cent.
Dilatation of the pupil...	Left.....	35	19.5
	Right.....	37	
	Unequal pupils.	123	
Loss of light reaction....	Both.....	72	8.5
	Right.....	8	
	Left.....	5	

"In this series of 1,000 cases, vomiting was a common symptom, and occurred in 361, or 36 per cent. of all cases. In eleven cases the vomitus was almost wholly blood."

In the diagnosis of cranial fracture, an accurate clinical history is of the utmost importance. One is able to thus determine the character of the instrument and the manner in which the trauma was inflicted, the approximate force applied, the location and probable extent of the injury. Where extensive laceration of the overlying soft tissues has been produced, with consequent exposure of the osseous structure over a considerable area, the diagnosis is apparent even to the tyro; but where the external tissues have merely sustained contusion, and especially if more or less tumefaction has already ensued, an expert may fail in accurate diagnosis based upon the clinical signs alone. It must be remembered that slight cranial irregularities and even depressions cannot always be identified by palpation

through the overlying integument, and the difficulties are correspondingly intensified by the swelling, edema and exudation which soon supervene.

Too much emphasis has hitherto been placed upon the diagnostic value of the so-called "cracked metal" sound solicited by percussion over the area of supposed fracture. In my experience this sign has seldom been definitely obtainable, and its presence proves nothing.

In every instance where fracture is suspected, regardless of the anatomic location, roëntgenography should be employed, usually supplemented by fluoroscopy. By no other means is it possible for the clinician to be absolutely certain of the correctness or falsity of his provisional conclusions.

The most important—and unfortunately the most unsatisfactory—feature in relation to cranial fractures is the treatment. During the last few years, however, the pessimism exhibited by older authors has been supplanted by more optimistic views, and the *noli me tangere* attitude no longer prevails. Surgical history shows that during periods not far remote, operative invasion of the cranial cavity was considered unjustifiable; and especially in extensive trauma with considerable osseous destruction and with probable corresponding damage to the cerebral tissues, was it believed that the invocation of surgery merely hastened inevitable dissolution. The mortality from serious head injuries was then practically 100 per cent.

The intelligent application of more modern surgical principles has rendered possible marked reduction in the mortality attending cranial as well as nearly all other lesions amenable to operative intervention. In the series of 1,000 clinical cases recorded by Besley the mortality was 53 per cent. In 239 cases of brain injury reported by Sharpe, 227 of which were cranial fractures, the mortality was 30.7 per cent.; and, excluding moribund patients who died within three hours after admission, the mortality was only 19 per cent.

The statement that every patient with cranial fracture should be subjected to operative treatment, would perhaps be further from the truth than the belief of older surgeons that operation should never be undertaken following cerebral trauma. In no department of practice is greater surgical judgment and skill demanded than in cranial and cerebral lesions. In doubtful cases, where the symptoms are obscure and no observable osseous depression exists, the decision to operate or not to operate must be made by the surgeon after due consideration of the clinical and röentgenoscopic findings. In all depressed fractures, with or without immediate symptoms, and in all compound, comminuted and perforative fractures, immediate operation should be performed. However, it must not be forgotten: (a) that rarely compression may result without fracture; (b) that simple linear fracture with extradural or subdural hemorrhage may produce results similar to those due to depressed fracture; (c) that the so-called inner table may be extensively damaged without observable external osseous injury; (d) that the extent of integumental trauma is no index to osseous and cerebral damage.

A safe and conservative rule for general guidance is to operate in every case of cranial fracture in which the symptoms are indicative of cerebral laceration or compression. In vault fractures the opening should be made at the site of injury; in basal fractures requiring surgery the subtemporal decompression operation is the procedure of choice. Drainage is necessary in all operations where the cranial cavity is invaded and the membranes incised.

In cases where palliative treatment seems advisable, or must be practiced to the exclusion of operative methods, absolute rest in bed, the application of ice-bags to the head, purgation, enemata of hot saline solution and black coffee, morphin hypodermatically to assuage pain and promote quietude, will be found the most advantageous measures. Although not strictly a palliative method of treatment, lumbar puncture is oftentimes useful in relieving the increased intracranial pressure resulting from slight edema and hemorrhage; but this procedure is not without danger and should be employed with extreme caution. Fatalities have followed the apparently simple procedure of spinal puncture where the intracranial pressure exceeded that of the fluid in the spinal canal, the vaso-motor centers being overcome from blocking of the foramen magnum resulting in fatal cerebral anemia. However, "if there exist the proper relationship or ratio between intra-cranial pressure and the pressure of the cerebro-spinal fluid, lumbar puncture is comparatively safe." It seems probable that in simple cerebral edema resulting from contusion, with slight increase of intra-cranial pressure, complete relief might be afforded by lumbar puncture alone.

Where the initial symptoms are indicative of more or less serious cerebral damage, early operative intervention is imperatively demanded, *i. e.*, while the pulse-rate remains low, before intra-cranial pressure is markedly increased, before the blood pressure is lowered, and before the dangerous stage of medullary compression and cerebral anemia has been reached. Late operations in cerebral injury due to cranial fracture are for the most part followed by disastrous results. Murphy states that if

the brain be so compressed that its circulation is totally impeded for twelve minutes, the patient will certainly succumb because the brain tissue cannot withstand total anemia for a longer period.

The technic of cranial surgery requires no further amplification, but there are certain features upon which greater emphasis might be placed. The prevention of infection by the most rigid adherence to modern principles of asepsis is one of the primary essentials to a successful outcome. In compound fracture the wound should be thoroughly cleansed before invading the cranial cavity, to minimize the danger of infection from without; if extensive cerebral laceration has occurred, after elevating or removing the damaged osseous structure, the cerebral tissues so devitalized as to be beyond hope of repair should be carefully excised. Adequate provision for drainage is imperative in every instance where the dura is incised, which should be always done if there be evidence of increased subdural pressure. A decompression operation without dural incision rarely accomplishes the desired result.

CASE I. A male, aged thirty-two, was admitted to the Louisville Public Hospital without any history excepting that he had received a head injury in an automobile accident and had been rendered unconscious. He was still unconscious when admitted; his breathing was sterterous, blood issued from his ears, mouth and nose; his pupils did not react to light; pressure upon the supraorbital nerve elicited slight response. Based upon the clinical findings, and especially considering the stuporous condition of the patient, the provisional diagnosis of extensive basal fracture was made, and under the circumstances I refused to operate, as it was believed the injury would prove quickly fatal.

The patient was placed in bed and instructions given that he be carefully watched. After being thoroughly cleansed with alcohol, his aural cavities were "plugged" with pledgets of sterile cotton. There was considerable subconjunctival hemorrhage, with a tremendous amount of edema around the right eye. The pulse was below 60; temperature and respirations showed nothing worthy of note. I believed death would supervene within a few hours, certainly before the expiration of two days.

The following morning the patient was answering questions more or less intelligently, and during the afternoon became thoroughly rational. There was no elevation of the temperature at any time. Two days thereafter, the only evidence that a fracture of the cranium had occurred, was the discharge of about two teaspoonfuls of spinal fluid from the right ear.

In this case there was undoubtedly a fracture extending into the petrous portion of the temporal bone (middle fossa) and also probably involving the anterior fossa. Contrary to my instructions the patient insisted upon leaving the hospital within a week. All the symptoms had disappeared, and the man said he felt perfectly well. It is my opinion that this patient will have trouble later in the form of epilepsy or other cerebral disturbance. Murphy required patients who had been rendered unconscious to remain in bed six weeks.

CASE II. In the ward the same day was another man, aged forty-four, who gave the history of having been struck on the head by a moving crane two days previously. He was rendered unconscious, and for some unknown reason was taken to the county jail, where I understand he was allowed to remain in an unconscious state for forty-eight hours before being sent to the hospital. However, this is questionable. When I saw the patient consciousness had returned. Examination revealed a superficial abrasion over the left parietal eminence which had then partially healed. So far as could be ascertained the man was perfectly normal with the exception that he was totally deaf in his left ear.

The patient was placed in bed for further observation, as there seemed no necessity for immediate operation. The next morning he said that he had passed a very uncomfortable night; that he could not sleep, and a severe headache had developed. The second day headache was more violent, and ¼ grain morphine hypodermatically failed to afford relief. The third day headache had become so intense that, although the patient had no other manifestations—no pupillary symptoms, paralysis nor anything indicative of cranial fracture excepting headache and left ear deafness—I decided to operate upon him without further delay. His temperature had gradually risen to 102° F., pulse 100. The operation revealed a linear fracture, which extended downward into the petrous portion of the temporal bone; the middle meningeal artery was completely torn across and had to be ligated; hemorrhage had not been very extensive. The bulging dura did not pulsate, and, when incised, a tremendous amount of edema was found, but there was present no blood clot. Two drains were introduced, one just above the ear, the other near the upper angle of the wound, where some trouble was experienced in controlling hemorrhage from the bone.

The morning after the operation the patient's pulse and temperature had declined to normal, and have remained so since. He slept well the first night after the operation, and remarked that "it was the best night he had spent since coming to the hospital"; and his wife said that he seemed more normal than at any time since the accident. The operation was performed seven days ago; the drains have been removed; the wound is healing normally; the patient's physical condition has improved, and he wants to leave the hospital.

Murphy recently suggested a method for arresting hemorrhage from the middle meningeal artery, which seems a most logical procedure. He says that in cranial fracture with injury to the middle meningeal, hemorrhage can be arrested by simply ligat-

ing the external carotid, the middle meningeal being a branch of the external carotid.

CASE III. A male, aged forty, was delirious or crazy when admitted and soon afterward apparently attempted suicide by butting his head against the wall. The diagnosis of cranial fracture had been made before the patient came under my observation, but the correctness of this opinion seems open to question. Of course it is very easy to say that a patient has a fracture of the skull, then let the blame for not operating fall upon the surgeon who says he has not.

This patient was admitted with the history that he had fallen from a window and sustained a head injury; he became so violent that he had to be restrained in the psychopathic department for two days; when removed to the surgical ward he again became violent, and by his own acts when unobserved the wound originally produced by the fall was reopened. Roëntgenoscopy could not be employed because the man was in such mental condition that he could not be kept quiet for a sufficient length of time. The diagnosis is still uncertain, and under all the circumstances immediate operative intervention seems inadvisable.

Of the two cases of cranial fracture reported, one was operated upon four days after infliction of the trauma and recovered. The other was not operated upon and also apparently recovered. How the patient in Case 1 happened to recover I do not know, unless it be there was absence of cerebral laceration. It was thought the patient would certainly die in a short time, and extensive basal fracture appeared so evident that röentgenoscopic investigation was not instituted, which of course is now regretted.

In Case 2 three *x*-ray plates were made, but the report from the laboratory stated that no fracture could be demonstrated. Operation revealed a linear fracture without any depression. When the severe headache developed, it was thought considerable intra-cranial hemorrhage had occurred. The fact that the dura did not pulsate was sufficient justification for its incision. When the dura is tense and non-pulsating, a decompression operation without dural incision is usually unproductive of benefit.

The patient in Case 3 is still under observation. The scalp wound has entirely healed; his mental status is gradually improving under treatment, and the uncertainty in diagnosis will be clarified by employment of the *x*-ray and fluoroscope so soon as his condition will permit.

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THE VALUE OF THE X-RAY AS AN AID IN THE DIAGNOSIS OF URINARY CALCULI.*

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The experimental stage of the Roentgen ray as a means of diagnosis has passed, and day by day it is coming into its own as the crowning achievement of progressive medicine of the nineteenth century.

In considering the indications for *x*-ray examination of the urinary tract the discomfitting fact is that a severe lesion is often present when it is least suspected; the result being that frequently we do not know when it is necessary and when it is not necessary to resort to every means at our command in an attempt to arrive at accurate conclusions.

Bransford Lewis, in an article on "Kidney Stones," says: "In the first place put no faith in symptoms, put your trust in reliable returns given by searching physical examination, including modern methods of internal inspection and investigation." He further says that "Identification of pus or infection in either kidney commonly indicates the application of *x*-ray photography to that side with or without the coincident use of radiograph ureteral catheters, or collargol injection for further elucidation."

Squier, of New York, says: "The so-called classic symptoms of renal calculus—hematuria, renal colic, and fixed pain—are so often absent as to be a negligible factor in arriving at an early diagnosis. More minor symptoms must attract us to the kidney as a possible seat of disease."

Squier quotes L. G. Cole as follows: "Most of the cases in which renal calculi have been demonstrated by the *x*-ray have had no symptoms that were sufficiently characteristic to justify an operation, and only those that engage in the ureter, or obstruct the pelvis cause typical renal colic."

Squier, commenting on Cole's statement, says: "Such being the case, a patient complaining of slight pain in the back, tenderness over the kidney, a sense of weight in the back, which is increased by jolting, or the presence of even a trace of albumen, should suggest suspicion of a calculous disease and be given the benefit of a complete routine examination of the urinary tract."

Hyman, of Mt. Sinai Hospital, New York, says: "The information obtained by careful history, physical and urinary examination may be of an entirely negative character and still serious disease be pres-

*Read before the Chattahoochie Valley Medical and Surgical Association, July 12, 1916.

ent. It is not generally recognized that stones may remain latent in the kidney for a long time, reaching a large size, and even destroying the parenchyma without producing focalizing symptoms. According to Cabot pain is absent in about 10 per cent. of the cases of renal calculus. Renal colic is present in about 50 per cent., and pain without colic in about 30 per cent."

Hyman further says: "Urinalysis gives valuable data in many of the cases, but it must be borne in mind that stones may be present with only microscopic changes in the character of the urine. Albumen, pus, and blood are present in over 80 per cent. of the cases. Stones may exist without the presence of red blood cells in the urine. It will thus be seen from this cursory review that unless more specific means for diagnosis are adapted many cases of renal calculus will be overlooked or mistaken for other conditions, and consequently many patients subjected to needless operations. Failure to take proper cognizance of these facts will still lead many to treat renal calculus for lumbago, sciatica, cholecystitis, appendicitis, and other conditions."

Statements such as I have quoted coming from men of recognized ability bring us face to face with the conclusion that many kidney cases are going on to disastrous results, which might be relieved if we were only more painstaking in our efforts to ascertain the true status of affairs in their incipiency.

Sequence of examination.—As suggested by Hyman in the examination of a suspected urological case, "it is advisable to carry out the different steps of the examination in their proper sequence. By so doing considerable time is saved, and unnecessary re-examination will often be avoided. For example, it would be unwise to cystoscope a patient before resorting to roentgenography; for should the latter demand a pyelogram or ueterogram for confirmation, it would entail a second cystoscopic examination; cystoscopy, ureteral catheterization, and uretero-pyelography could all have been combined at one sitting."

Relative value of examination.—Drs. Shropshire and Watterson, of Birmingham, in a recent article state: "The cystoscopic examination and functional test, together with careful urinalysis, is by far the most important. Next would come the radiographic examination, and then would be placed in line the physical findings and the patient's history."

Lilienthal, of New York, who reverses the order of relative value, says: "After radiography comes the cystoscopic examination of the ureters and kidneys. This sequence, radiography first and cystoscopy afterwards, should be strictly observed because cystoscopy is apt to be attended with greater inconvenience, not to say danger to the patient, than modern examination with the *x*-ray."

Hyman says: "Roentgenography, cystoscopy and ureteral catheterization, and pyelography are indispensable diagnostic agents in the examination for renal calculus. Of the three roentgenography is the most valuable procedure." He further says: "The roentgen rays will demonstrate the presence of renal calculus in probably 98 per cent. of the cases."

Thompson Walker has recently stated: "In an aseptic case the absence of a stone shadow, after two or more examinations when a plate of the first quality has been obtained, excludes all but a pure uric acid calculus. When the urine is alkaline the absence of a stone shadow excludes a calculus of any composition, for it is certain that phosphates will have been deposited upon a uric acid calculus and render it opaque to the roentgen ray."

Carman quotes Fenwick as saying: "One of the most distressing of failures in urinary surgery is to cut into a kidney and mutilate it, perhaps irreparably, in order to find a stone which has long left that organ and traveled down the ureter; and yet this must happen in at least 22 per cent. of all cases of renal stones if the *x*-ray expert is not called upon to help in the diagnosis."

As to the relative value of the cystoscopic and radiographic examinations, my own opinion is that they are equally indispensable; and because of the valuable information that can be derived from both procedures, although frequently of an entirely different character, I would hesitate to give either precedence.

I think that urologic diagnosis would be seriously crippled if either were eliminated, and that its future is materially dependent upon the proper correlation of both methods.

Advantages of the method.—(1) It is painless. (2) it gives the location, size, and number of stones. (3) It may show other pathological conditions not suspected. (4) It gives an idea of the condition of the opposite kidney and ureter, especially if used in conjunction with pyelography. (5) Frequently pain is referred to the opposite kidney or ureter, and the lesion will be found in the supposedly sound organ.

Disadvantages.—(1) It is more or less expensive depending largely upon the number of plates made. (2) It is not infallible. (3) It is not always accessible. (4) A severe lesion of the opposite kidney may be present and give no radiographic evi-

dence, therefore it is not to be relied upon to the exclusion of other methods.

Possible causes of errors.—(1) Shadows cast by opaque bodies in the intestinal tract. This error can be avoided by administering a vegetable laxative the day before the examination. (2) The heavy shadows due to gas in the colon may obscure the light kidney outlines, or soft calculi. This source of error may also be eliminated by proper purgation and administration of enemas. (3) Imperfect technic and defective plates. It is essential that the emulsion on the plates be even and without spots; and that the developed plate shows clearly the vertebral column with its transverse processes, the last two ribs, the outer border of the psoas muscle, and the bony structures of the pelvis. (4) Phleboliths, gallstones, foreign bodies in the appendix, cheesy deposits in the calices of the kidney due to tuberculosis, papillomata and warts on the skin, calcified costal cartilages, etc., may cast shadows which will require differential diagnosis. Aside from their physical characteristics, with rare exceptions such shadows can be differentiated from those cast by renal or ureteral calculi by showing their relation to the opaque catheter, or the injected ureter and pelvis. (5) Occasionally in an unusually large or fleshy person a negative finding will be made when a stone is present. (6) In case of uric acid stones, no shadow may be present on the radiographic plate.

Interpretation of the plate.—In order to more accurately localize the position of shadows, Harry Fenwick divides the loin space into two divisions by a vertical line extending from the crest of the ilium to the ribs. This is known as the mid-vertical line, and Fenwick formulates the following axioms: (1) Shadows outside the mid-vertical line are usually cast by contents of the bowel. (2) Shadows inside the mid-vertical line are usually urinary shadows, or rarely cretaceous gland shadows. (3) Shadows arranged along the mid-vertical line or near it are not infrequently collections of stones in the cortical portion of the kidney.

If the results are positive a confirmatory examination should be made, either with stereoscopic plates made with an injection of an opaque solution into the ureter and pelvis of the kidney, or with an opaque catheter in situ.

If the shadow is in the lumen of the ureter or pelvis of the kidney it will be obliterated or obscured in the pyelogram. If it is extra-ureteral or extra-renal its position with reference to the shadow of the injected ureter and pelvis will be shown.

In ureteral and vesical caluculi a considerably higher per cent. of failures is recorded from the radiographic examination.

Stewart quotes Braasch and Moore, of the Mayo Clinic, as saying, "It is doubtful if an accurate diagnosis of stone in the ureter can be made from roentgenographic data alone in more than 60 per cent. of the cases." Stewart does not accept this as final and says: "In Cabot's 127 cases recently published, 8, or 6 per cent., were persistently negative. New York roentgenologists such as Caldwell, Cole, Jaches, and LeWald do not concede failures in any such high percentage. Baetjer, of John Hopkins, however, states his negative findings in positive cases amount to about 25 per cent."

Stewart further says: "While I am not in position to give accurate figures, my experience would suggest failures in about 5 per cent. of renal and ureteral calculi, and about 10 to 15 per cent. in vesical calculi."

Interpretation of shadows along the course of the ureters is much more difficult than in the region of the kidney, the reasons being that adventitious shadows are much more common, especially along the lower ureter, and that the shadow is often superimposed upon the bony structures of the pelvis. The same reasons apply to shadows in the bladder region. In addition the bladder stone often consists of pure urates, which it is difficult, if not impossible, to detect by the roentgen ray. A calculus not visible in the ordinary radiogram may occasionally be seen if the bladder be inflated before making the radiogram.

Kummel suggests the injection of an opaque silver salt into the bladder and making a radiogram the following day. His theory is that the calculus will become coated with the colloid silver, and thus project a shadow on the plate.

ABDOMINAL SURGERY

The greatest factor to be considered in lowering the death rate in this and all other forms of surgery is the surgeon. His judgment as to what cases should be operated upon and what cases should be left alone, as to the time to operate and the time to wait, and as to how much and how little should be done; the time saved in operating on the very weak and those suffering from severe shock; the care and ease used in handling the patient; the confidence instilled into the already frightened and nervous individual, and many other things that cannot be thought of all make a great difference in the death rate.—EZRA C. RICH in *Colorado Medicine.*

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, OCTOBER, 1916.

PAIN IN THE ARM.

It is not generally appreciated, as it should be, that pain in the arm is very often, perhaps most often, a surgical affection rather than the "neuritis" or "rheumatism" for which it is usually (mis)-treated.

Brachial neuritis is a very real disease, to be sure, but it is comparatively uncommon, and the diagnosis can not be accepted unless there is distinct nerve tenderness, definite pain distribution and —if the condition has lasted long—sensory, motor or trophic disturbances.

Rheumatism without articular inflammation, i. e. so called muscular rheumatism, is an altogether untenable diagnosis if the pain is limited to one arm.

Among the less common surgical affections that may cause pain in the arm are cervical rib, localized periostitis of the scapula or humerus, and inflammatory or neoplastic lesions of one of the bones. There is an affection of the long bones which is apt to escape diagnosis and which, so far as we know, has not been described—chronic, sterile, afebrile, medullary abscess. This produces severe pain, and is marked by exquisite local bone sensitiveness. Roentgenographically the appearance is that of an osteoperiostitis, the thickened corticalis encroaching upon the medullary cavity. The pus, which produces no shadow, lies above or below the zone of thickened cortex.

By far the most common surgical lesion causing pain in the arm is subacromial (subdeltoid) bursitis. This, an affection of adult life, often appears to arise spontaneously, although it probably has its origin in some trauma—often a comparatively mild internal violence. Although pain in the shoulder is also common in this affection and there usually is, or has been, more or less—sometimes very pronounced—disability of shoulder function, these are not constant symptoms. Nor, usually, is there any local swelling or other deformity about the shoulder. The most constant symptom is pain in the outer or anterior aspect of the arm. When this pain extends into the forearm or even the hand it is very apt to be mistaken for that of neuritis, especially if there is an associated atrophy of the deltoid and the spinati. In many, but by no means all cases, of subdeltoid bursitis, a roentgenogram will reveal the tell-tale subbursal lime deposit concerning which there have been so many mistaken notions. This lime deposit, for the production of which we may yet find some predisposing metabolic fault, appears to us to be also traumatic in origin, arising from an injury to the supraspinatus (occasionally the infraspinatus) tendon associated with trauma to the overlying tendon, as we have demonstrated surgically and histologically.

We shall not here refer at length to the diagnostic aspects of subdeltoid bursitis, elsewhere described, nor to the various other conditions that may cause pain in the arm. The purpose of this editorial is to call attention to the desirability of looking for that very common affection, and of seeking the aid of the Roentgen ray in all cases of pain in the arm.—W. M. B.

THE TRANSVERSE ABDOMINAL INCISION.

The transverse abdominal incision of Sprengel, especially as it has been modified by Perthes, seems to be growing into favor among surgeons, and deservedly so for it possesses certain distinct merits and no very serious drawback. A. V. Moschcowitz (*Annals of Surgery*, September, 1916) is the latest to extol the transverse incision in the surgery of the upper abdomen, where he has employed it in a large number of cases during the past six years.

Moschcowitz emphasized certain anatomical facts that make the transverse incision more "physiological" than the vertical. He states, quite properly, that "the sheath of the rectus" should not be regarded merely as a sheath but as the aponeurotic expansions of the external and internal oblique and the transversalis muscles; and, since the pull of these muscles is lateral it is more physiological to incise their aponeuroses transversely than longitudinally. Theoretically this is true but, in fact,

the fibers (or "little tendons," as Moschowitz calls them) of these aponeuroses are not disposed transversely alone, but decussate at various angles of obliquity; and *when these aponeuroses are divided transversely they gape even more than when the incision is vertical* (*longitudinal.*) Moreover, if it is physiological to incise these aponeuroses transversely it is certainly unphysiological to divide the rectus muscle transversely.

All those who have advised the transverse incision have based its merit in part upon the transverse disposition within the rectus sheath of the intercostal nerves (supplying the rectus and peritoneum) which, therefore, are liable to injury by a long vertical incision. Usually these nerves can be drawn aside; and if one or even two of them are cut or torn in a long rectus-splitting incision this produces no ill-effect, so far as we have been able to note.

The greatest disadvantage of the transverse approach is that it takes much longer to execute than the vertical, since it requires the placing of two rows of fixation sutures to control the vessels in, and prevent the retraction of, the rectus. To balance this admitted drawback Moschcowitz tells us that though it takes longer "to get in" it is much easier "to get out" with the transverse incision. Admittedly it is sometimes extremely difficult to suture the peritoneum in a vertical incision if the patient is obese or is straining. Then the peritoneum is apt to tear at the sutures, leaving gaps that needs must cause omental or other attachments and adhesions. All abdominal surgeons are familiar with the time-consuming difficulties that present in such cases—difficulties that are not encountered with the transverse division. But we must remind Moschcowitz that although with the transverse incision it *always* takes long "to get in," with the vertical incision it only *sometimes* takes long "to get out."

Cosmetically, the transverse incision has the advantage; it leaves a much less conspicuous scar.

The exposure secured by the transverse incision is quite satisfactory, especially if it is carried as far beyond one rectus in either direction as may be needed. It is therefore useful for operations upon the stomach, the colon, the pancreas. To reach above or below it requires much the same retraction as the vertical incision requires to reach tissues to one or the other side. For cholecystectomies we still incline to prefer the vertical incision. It affords at least as good exposure of the common bile duct and, if carried up to the costal border itself, it allows eversion of the gall-bladder and much of the liver, an important aid in the operation which, necessarily, the transverse incision scarcely permits. Nor have we ever found it necessary to add to the vertical incision cross curved or oblique cut for any operation on the bile passages. For large tumors of the bowel occupying the loin, the transverse incision, liberally extended, is very acceptable.

When all is said and done, almost any intraabdominal operation can be performed through either a vertical or a transverse incision. Either can be made to give adequate exposure.

The "physiological" considerations are, as we have pointed out, theoretical rather than practical. Properly sutured and healed *per primam*, the abdominal wall is restored without loss of substance or function whether it is divided longitudinally or transversely.

It seems to us that neither mode of approach should be adopted as a routine to the exclusion of the other. Both are good; and the surgeon should be facile with both and should employ now one, now the other, as the individual case may suggest. —W. M. B.

ANNOUNCEMENT.

SPECIAL ISSUE DEVOTED TO OBSTETRICS AND GYNECOLOGY.

The November issue of THE JOURNAL will be a special number devoted exclusively to Obstetrics and Gynecology. It will contain many interesting articles by prominent specialists, most of them written for this issue.

Surgical Suggestions

Portal vein thrombosis is probably not always fatal. Occasionally patients with all the classical signs and symptoms of suppurative pylephlebitis spontaneously recover.

The healing of pus pockets and suppurating sinuses after appendicitis is facilitated by cleansing them daily with injections of hydrogen peroxide; but this, of course, should not be undertaken until the sinus or pocket is surrounded by a solid wall of granulations.

A yellow or yellow-gray membrane appearing in a wound should be carefully investigated. It may be a diphtheria infection which, though rare, should always be thought of. It is advisable to administer large doses of antitoxin without waiting for laboratory confirmation of the diagnosis for, unless quickly dealt with, such an infection is usually soon fatal.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

Pay Clinics.

The extension of clinical facilities for paying patients is at present agitating the minds of many interested in medical economics. Under various plans proposed, ambulant patients of moderate means, who are not entitled to free dispensary treatment under ordinary circumstances, are to have the opportunity of consulting specialists, whose office fees are beyond their means. In most instances, this type of clinic is restricted to those whose annual income is $1,200 per annum or less.

While there are fears that a clinic of this character actually competes with the family practitioner, the experiences in Boston, Brooklyn, and Cleveland indicate that pay clinics undermine quackery, reduce drug store medication, afford better service to patients, and actually yield scientific possibilities advantageous to the general practitioner endeavoring to make proper diagnoses upon patients unable to afford the special investigations or specific diagnostic services.

In connection with this plan, there is the admirable principle of remuneration for the physicians, specialists or otherwise, whose services are being utilized in the extension of the project. Moderate charges are made for *x*-ray work and for unusual laboratory investigations. The earnings of such dispensaries are in some instances divided between the dispensary and the workers. In some institutions the workers receive a definite nightly compensation for a definite period of time of service.

With reference to the legality of pay clinics, as violating the proper interpretation of dispensary use, a recent decision by the Attorney-General of New York State is quite noteworthy. Inasmuch as dispensaries have been classed as charitable institutions, their abuse has been the subject of considerable comment and discontent. To establish, therefore, in a dispensary a pay clinic would at first thought appear to be a violation of the spirit in which such institutions were organized for the benefit of the public.

The Attorney-General unhesitatingly states that a charge in itself would be lawful. "Whether a person who pays one dollar for treatment at such a dispensary is a proper object for charity, depends entirely upon the circumstances in each individual case. If all that patient can afford to pay is one dollar, and he may obtain treatment by a specialist for that amount at a dispensary, while treatment by the same specialist at the patient's home or the physician's office would be entirely above his means, I do not see why such patient cannot avail himself of the services of such specialist."

He further expresses himself as of the belief that dispensaries of this type should be "encouraged and assisted rather than hampered and hindered."

This opinion is one of the first utterances on the legal aspects of pay clinics. The problem now exists of satisfying the profession of the justice of pay clinics and of convincing them that such institutions do not tend to undermine the sources of private practice.

A theoretic judgment upon a matter of this kind is naturally prejudiced by one's own relations to medical practice. To the man approaching the subject with an open mind, it becomes necessary to investigate the facts as thus far developed in cities where pay clinics have already been instituted. An analysis of the results thus far obtained suffices to show that many of the fears are groundless and that the advantage to be derived by both physicians and patients far outweigh any disadvantages which would seem to exist on theoretic grounds. There is every reason to believe that pay institutions are to become more numerous and will occupy a prominent place in the development of dispensary systems.

There lies a latent danger in arbitrary decisions on the part of institutions, wherefore it becomes essential that dispensary workers have every opportunity to co-operate in working out the basis of pay clinics and establishing the rules and regulations and in developing the policies which are to be pursued. Only by united efforts of those vitally interested in the question is a rational plan to evolve which will satisfy the medical profession and yield the most fruitful results to society. The social advantages to the pay clinic are inestimable and the benefits to the general practitioner may be of little less value.

Experience has shown that there is reason in going slowly in instituting paid dispensary service. The first clinics developed merely took care of such specialties as venereal diseases or eye diseases. The great number of general clinics existing manifest the importance of other specialties equally important to the great middle class public, which are equally entitled to consideration in the development of out-patient departments.

The economic basis of practice is the charge made to the well-to-do and on this basis has been justified the vast amount of gratuitous service given

by physicians to the poor, in addition, of course, to the actual personal return secured by reason of experience or by the acquisition of a mass of clinical material available for teaching purposes. The largest proportion of the community, however, does not come within the delimination of the pauper class or extremely poor, but is represented by the self-respecting individuals whose insufficient margin of income does not enable them to take the advantage of the best medical service or continue to receive such service for a long period of time.

The standards of medical service today are higher than ever. The growth of the habit of consultation is indicative of the importance placed upon accurate diagnosis and improved methods of treatment. The extent to which the general public is capable of taking advantage of these two factors in modern medicine is restricted because of economic pressure. This is the idea which underlies the great questions of health insurance, accident insurance, workingmen's compensation acts, employers' liability acts, and similar movements for social insurance.

The facts are undeniable and in the interests of efficient social service and social justice, it is proper to establish pay clinics to give the fullest opportunity to the bulk of the population to receive the special services which are needed at a fee which is within their means and with a distinct gain in the character of the services performed. There is naturally a suspicion on the part of many that to make a statement of this character is antagonistic to the best interests of the profession; that it is a reflection upon the nature and type of service now being offered and performed by the bulk of the physicians in the country.

It is only the exceedingly sensitive individual, who is thinking in terms of money rather than in degrees of service, who does not properly inventory the shortcomings of the profession. It is no disgrace to recognize weaknesses for the purpose of developing strength. It is no crime to criticise conditions arising from economic forces with a desire to placing greater facilities at the disposal of the profession. How many physicians actually own microscopes, possess an X-ray outfit, have a clinical laboratory, or the apparatus essential for the diagnosis of pathological specimens? The percentage is not sufficiently large to warrant a feeling of superiority in equipment beyond friendly criticisms, and yet, these are, today, requisites for the best types of medical and surgical service.

The surgeon has unhesitatingly criticised the standards of surgery in this country and the Fellows of the American College of Surgeons do not hesitate to demand higher standards for the practice of surgery. They would indeed limit the practice of this art to those especially trained in particularly well equipped hospitals. The underlying idea is certainly the improvement of surgical service in the interests of the general public. And this, after all, is the very basis of all our efforts to improve the standards of medical service. The pay clinic is an institution for cooperation, for team work in diagnosis and treatment, which today is possible only for those of large financial means. The same opportunities should be afforded to all and for this reason the opposition to the pay clinic must naturally succumb to the greater interests of the suffering public.

Book Reviews

Man—An Adaptive Mechanism. By George W. Crile, F.A.C.S., Professor of Surgery, School of Medicine, Western Reserve University; Visiting Surgeon to the Lakeside Hospital, Cleveland. Edited by Annette Austin, A.B. Octavo; 387 pages. New York: The MacMillan Press, 1916.

Crile has written this book upon the hypothesis that man is a mechanism, obeying the laws of physics, and that essentially this mechanism functions as an energy transformer. He elaborates this theme, pointing out that the individual is, moreover, an adaptive mechanism, dependent for its life and its death upon all the physical conditions of its environment. As new life comes into contact with existing life, the varied stimuli of the world create in the plastic brain of the new-born babe a great number of "action patterns," each the projected brain impression of action executed during a wakeful moment. Furthermore, energy transformation produces "acid by-products." These by-products are neutralized by the respiratory, adrenal, and liver systems—as measured by the H-ion concentration of the blood. The H-ion concentration affects the stimulation or inhibition of the higher brain centers, which, in turn, drive the kinetic system of man. In this way the cycle is completed.

During sleep this train of phenomena is altered. The brain is spared shocks (and acid productions) since no stimuli by contact or "distance ceptors" reach it. Crile argues, therefore, in anociation he simulates for man the conditions of sleep in that he isolates the brain by dulling pre-operative sensibility, by blocking the "distance ceptors" with general anesthesia, and by blocking afferent nerve paths with local agents.

Treatise on Fractures. By John B. Roberts, A.M., M.D., F.A.C.S., Professor of Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; and James A. Kelly, A.M., M.D., Attending Surgeon to St. Joseph's, St. Mary's, and St. Timothy's Hospitals, Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine. Octavo; 677 pages; 909 illustrations. Philadelphia and London: J. B. Lippincott Company, 1916. Price, $6.00.

The purpose of the authors is to present a clear view of the entire subject of fractures, particularly in the light of recent discoveries, and to emphasize accurate scientific procedures, operative or otherwise, according to the nature of each injury.

The first chapter deals with the general aspect of the

subject, considering the etiology, symptomatology, and treatment of all the various types of fracture. The successive chapters take up the fracture-injuries of each bone, adequately illustrating all the essential points involved in the consideration of each subject. Vertebral fractures are specially well presented; the photographs of the zones of anesthesia produced by the respective vertebral lesions are accurate, valuable, and striking. Each extremity is discussed separately, also the skull, thorax, etc. A short but valuable chapter on child fractures and another on gunshot fractures complete the book.

The volume is well planned, well written; the text is clear, the accompanying illustrations are very good. The book should prove of value to the student and practitioner.

Maladies des Organes Génitaux de l'Homme. By Pierre Sebileau and Pierre Descomps, Professors of the Faculty of Medicine, Paris; Surgeons to the Lariboisière and Paris Hospitals. Octavo; 675 pages; 150 illustrations. Paris: T. B. Baillière and Sons, 1916. Price, 15 francs.

This large volume represents one of a series in a general system of surgery, other volumes of which have been here reviewed. It is an exhaustive survey of genito-urinary diseases. While there is no new point of attack in the scheme of this work, it aims to consider the disorders of each organ separately, and to bring before the reader the best of new advances in pathology and treatment. About 100 pages are devoted to a splendid consideration of testicular tumors. Operative indications are clearly presented, and technical procedures are discussed lucidly. Acute and chronic lymphangitis, gangrene of involved organs, torsion of the spermatic cord, the therapy of the tuberculous testis—these matters are treated in a thorough and scholarly manner and in a style that is fresh and clear.

Skin Cancer. By Henry H. Hazen, A.B., M.D., Professor of Dermatology in the Medical Department of Georgetown University; Professor of Dermatology in the Medical Department of Howard University, etc. Octavo; 251 pages; 97 text illustrations and one colored frontispiece. St. Louis: C. V. Mosby Co., 1916.

This is an excellent monograph upon the cancerous and pre-cancerous dermatoses. The text is didactic, systematically written, and covers every phase of the subject from pathology to treatment. Of especial interest to us is the part devoted to pathology, which, while not revealing unusual depths of learning, is satisfactory for all practical purposes. The text is interspersed with numerous references to the literature, although the personal note is everywhere dominant. The illustrations are unusually good.

Elements of Active-Principle Therapeutics. By John Marshall French, M.D. Duodecimo; 128 pages. Chicago: The Abbott Press, 1916.

This small book contains a series of lectures on the development of active-principle medication, its principles and the elements of their application. They are written with an elegance of diction and charm of style that are rare in medical literature and, quite aside from that aspect, they are interesting and illuminating.

Books Received

Physics and Chemistry for Nurses. By Amy Elizabeth Pope, Instructor in the School of Nursing, St. Luke's Hospital, San Francisco; author of "Anatomy and Physiology for Nurses," etc. Duodecimo; 441 pages; illustrated. New York and London: G. P. Putnam's Sons, 1916. $1.75.

Collected Papers of The Mayo Clinic, 1915. Edited by Mrs. M. H. Mellish. Volume VII. Octavo; 983 pages; 286 illustrations. Philadelphia and London: W. B. Saunders Co., 1916.

Progress in Surgery

A Résumé of Recent Literature.

The Treatment by Splenectomy of Splenomegaly with Anemia Associated with Syphilis. H. Z. Giffin, Rochester, Minn. *American Journal of Medical Sciences*, July, 1916.

1. It is probable that the syndrome of splenic anemia and Banti's disease may be present in a patient who has had syphilis, in whom it cannot be demonstrated that the syphilis is a definite etiological factor in the condition.

2. Cases of marked splenomegaly in which syphilitic cirrhosis of the liver, or gummata of the liver, are present, or in which repeated positive Wassermann tests together with other evidence of infection are obtained, should be separately classified and studied.

3. Because of the fact that syphilitic splenomegaly with secondary anemia has persisted in spite of active antisyphilitic treatment, splenectomy has been done elsewhere in three recorded cases. Three additional cases of this character are herewith reported.

4. The results following splenectomy for marked splenomegaly associated with syphilis and anemia performed after a trial of antisyphilitic treatment seem to have justified the procedure in these few instances.

5. The three cases herewith recorded showed prompt improvement after splenectomy and were in excellent condition three months, eight months, and one year respectively from the date of operation.

Indications for Splenectomy in Certain Chronic Blood Disorders: The Technic of the Operation. D. C. Balfour, Rochester, Minn. *Journal American Medical Association*, Sept. 9, 1916.

Balfour says that splenectomy has already proved a curative measure in certain diseases associated with definite blood changes and has recently been advocated in other diseases that seem more or less closely related to those in which the spleen is the known causative factor. Splenic anemia affords the most familiar example of its therapeutic value. While the interdependence of the spleen and liver is not clearly understood, there is ample evidence to show that some of the most important functions of the liver are more or less controlled by the spleen, and during the last two years, with this theory as a basis, selected patients with primary hepatic cirrhosis have been splenectomized. Balfour and others have seen good results follow splenectomy in three cases of syphilitic spleen. It may be assumed from the facts that the spleen picks up the spirochetes and harbors them, and its removal, followed by specific treatment, causes prompt and permanent relief. The use of splenectomy in pernicious anemia is on trial and the final decision as to its value cannot be stated. The larger the spleen, it would seem, the better the prospects of good from splenectomy in diseases in which it is indicated. A marked icteric discoloration of the skin in pernicious anemia may be taken as an indication that the spleen is to a large extent responsible. Blood transfusion in small quantities at frequent intervals has been recognized as a valuable treatment, though giving only temporary relief in pernicious anemia. It has recently become evident that it is also of distinct prognostic value. Definite improvement after transfusion is a strong indication for splenectomy, and no improvement, the reverse. At Rochester splenectomy has been found of less technical difficulty in pernicious anemia than in any other disease. An abdominal exploration should first be made after the incision in view of the frequent complications of liver and gall-bladder. The dislocation of the spleen is not as a rule complicated by formidable adhesions. In certain cases the tip of the pancreas must be dislodged from its position if the pedicle is to be ligated without injury if it rests in the hilus of the spleen. It is rarely of sufficient size to present difficulties. It is comparatively easy to isolate the arteries and veins and ligate them separately. After all bleeding points have been controlled, the pack is removed

and the diaphragmatic surface inspected. They believe that splenectomy should be considered in every case of pernicious anemia with established diagnosis after all possible etiologic factors which might be independently remedied have been excluded. The failure of other means, the previous fatal prognosis, and low operative mortality are strong arguments in favor of splenectomy, and contraindications must be positive and adequate. Granting this, however, our imperfect knowledge makes caution advisable and a conservative selection of cases should be made.

Splenectomy for Hemolytic Jaundice. C. H. PECK, New York. *Journal American Medical Association,* Sept. 9, 1916.

The first case, in a young woman 30 years of age, was of the congenital nonfamiliar type and was the first patient in this country on whom splenectomy was performed for hemolytic jaundice. It was first noticed when she was 3 days old and existed in mild degree with no other symptoms until she was about 21, when she first had an attack of deepening of the color. This has been followed by other similar attacks, without other symptoms than a general tendency to intensification. She has never had itching, slowing of the pulse, or any other symptoms of ordinary obstructive jaundice. In 1907, a cholecystostomy was performed in Baltimore, but no gallstones or other lesions were found and the jaundice returned and persisted as soon as the biliary fistula healed. Two and one-half years later she was admitted to the Johns Hopkins Hospital, and a diagnosis of congenital hemolytic jaundice was made by Thayer, who did not advise operation. Her red cell fragility was the same as noted by Peck, three years later. In 1911 she entered a hospital in New York on three separate occasions, but no operation was done. The jaundice so preyed on her mind, however, that she came to the Roosevelt Hospital again in 1912, and an examination was made and a little later an exploratory opertion was done. There were no adhesions and the operation was well borne. Diminution in the jaundice was noted after the third day, and by the tenth day she was entirely free from jaundice for the first time in her life. The striking features of the case were the marked fragility of the red cells and their prompt return to normal after splenectomy, a result which has been by no means uniform in the reported cases. Another was a rather checkered medical experience and the fact that her treatment coincided with the developmental stage of our knowledge of the condition. In the second case the red cell fragility was less marked and it was of the acquired type. Splenomegaly was pronounced, the spleen weighing 800 gm. The jaundice disappeared, as in the other case, after operation, but the fragility remained. The third case mentioned was operated by Dr. J. I. Russell, who permits Peck to include it in his report. The results were equally good, though the patient had been jaundiced since birth. That hemolytic jaundice is not uncommon, and that it can be cured by splenectomy, are facts now well recognized, Peck says, and recent additions to the literature are emphasizing the importance of these facts.

Relief of Chronic Obstructive Jaundice by Palliative Operations. J. F. ERDMANN and C. G. HEYD, New York. *American Journal of Medical Sciences,* August, 1916.

Conclusions: 1. All cases of obstructive jaundice are entitled to operative consideration. There is a certain definite percentage of cases that are cured because there has been a mistake in the diagnosis.

2. Operations are not prohibitive considering the severity of the disease and its hopeless outlook.

3. The immediate relief from itching, in addition to the prolongation of life, is an exceptionally strong argument for operation.

4. Operation obviates the development of "pressure pain" from increasing distention of the biliary apparatus.

5. These operations are advised solely as palliative procedures and as such their purpose must be clearly understood.

Some Observations on Congenital and Acquired Hemolytic Icterus: With a Report of Two Cases Treated by Splenectomy. G. E. BREWER, New York. *Medical Record,* July 1, 1916.

After an excellent résumé of this rare condition, Brewer reports two cases in which the jaundice was entirely relieved and the physical condition was considerably improved after splenectomy. He regards early splenectomy as a comparatively safe and the only successful method yet suggested to cure this condition.

The Radical Treatment of Gastric Ulcer. J. CUNNING, London. *Lancet,* July 22, 1916.

Cunning is convinced that gastro-jejunostomy is unsatisfactory as a cure for gastric ulcer and may even add to the discomforts of the patient. He holds that all gastric ulcers can be excised except those adherent to important structures, and gastro-jejunostomy is useless for these. In such instances, the stomach can be detached from the base of the ulcer, the opening closed, and the base of the ulcer, after being scraped, is excluded from the stomach.

Observations on the Occurrence of Syphilis in the University of Michigan Obstetric and Gynecologic Clinic. REUBEN PETERSON, *Surgery, Gynecology and Obstetrics,* September, 1916.

Out of 2,000 patients in the University hospital, excluding the syphilological and neurological services, the proportion of syphilitics was 6 per cent. There were 381 obstetric patients with 18 luetics, or 4.7 per cent.; 390 gynecological cases with 22 luetics, or 5.6 per cent. The diagnosis was made by Wasserman reaction and expert physical examination. Of the 18 obstetric luetics, only 8 gave a history of lues. In these 8 cases there was positive clinical evidence of lues. The possibility of a full-term living healthy child in syphilitic mothers is greatly enhanced by treatment with salvarsan and mercury. The new-born infants of the mothers, so treated, do not give positive Wassermann reactions, although undoubtedly they are syphilitic and later probably will show signs of the disease. A certain proportion of the new-born children of untreated syphilitic mothers will give positive Wassermann tests. Only by routine Wassermann tests will the obstetrician and gynecologist best serve the interests of his patients. Especially is this true in hospital practice, where even careful histories fail to arouse suspicion of latent syphilis.

Epiploitis Following Herniotomy. WILLIAM HESSERT, *Surgery, Gynecology and Obstetrics,* September, 1916.

The majority of cases in which epiploitis follows a herniotomy run a subacute or chronic course lasting for months or even years. The free interval after operation is generally of four to eight weeks' duration, but cases are on record in which two or three years elapsed before the onset of symptoms. Pain is one of the first and most constant symptoms. Frequently it is in the upper part of the abdomen and is aggravated by deep breathing, coughing or tight clothing. Fever may be and usually is associated with the pain, but as a rule subsides with spontaneous recovery. Suppuration occurs in some cases and the epiploitis may then simulate acute lesions referable to abdominal viscera. The slow chronic form of epiploitis may simulate carcinoma and even at laparotomy doubt may be expressed concerning the character of the mass, appearing like a carcinoma or sarcoma. The tumor is usually on the same side as the herniotomy, on a level with or above the umbilicus. It is usually easily palpable, being attached to the abdominal wall and does not move with respiration.

Hessert advises against rough handling of the omentum and of ligation en masse. He prefers to use fine absorbable ligatures for the vessels themselves.

Operative interference is not always necessary, as a fair proportion of cases recovers under expectant treatment. When an exploration is indicated the inflammatory mass should be excised completely. If this is not feasible on account of adhesions and abscess formation, thorough drainage should be established.

ANESTHESIA SUPPLEMENT—FOLLOWING PAGE 336

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A Magazine of Practical Surgery in All its Branches

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AMERICAN
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VOL. XXX. OCTOBER, 1916. No. 10.

OPERATING UPON THE POSTERIOR FACE OF THE STOMACH BY THE INTER-COLO-EPIPLOIC ROUTE.

B. SHERWOOD-DUNN, M.D.,

Officer d'Académié, Membre Correspondant de la Société Obstétrique et Gynécologique de Paris; Surgeon to the Service de Santé Militaire de Paris; Physician to Cochin Hospital.

Lardennois and Okinczyc some three years ago demonstrated the feasibility and advisability of exposing the posterior face of the stomach for total colectomy, and my esteemed friend and colleague, Professor V. Pauchet, finding that by their procedure, hereinafter described, he could largely expose not only the posterior face of the stomach, but also the duodenum and pancreas, has practically adopted it for all gastric operations, and especially for the repair of gun-shot wounds.

The procedure recommends itself by absence of hemorrhage and ease of accomplishment, and I believe it will meet the general approval of those surgeons who become acquainted with its technic.

Since the beginning of the present war the discussion has not ceased as to the advisability of surgical intervention in wounds of the abdomen, and I am one of those who has fixed, as the requisites for such intervention, five essentials: a good operator, aided by a good assistant, with good and proper surgical materials and appliances, in a good, safe location and surroundings, and unhurried time in which to operate. Lacking these elements, abstain from operative intervention.

For perforating wounds of the stomach, where it is necessary to reach the posterior face, the operator has the choice of four routes.

1. *By the gastro-hepatic route.*—The lesser omentum is pierced by the index finger at the border of the curvature permitting the finger to explore the posterior gastric aspect: a narrow and blind procedure.

2. *By the transmesocolic route.*—The ordinary choice where the surgeon desires to perform a posterior gastro-enterostomy.

At a level of one of the vascular arcades of the mesocolon an opening is made, affording access to the posterior face of the stomach. This route is easy but circumscribed.

3. *The colo-gastric route.*—This consists in cutting the colo-gastric ligament at the border of the greater curvature and separating the transverse colon from the stomach. The stomach is lifted up, freed from the great omentum, which remains adherent to the transverse colon, which is pushed down with its mesentery.

This maneuver gives an open field, but is more or less slow, as it requires a number of ligatures.

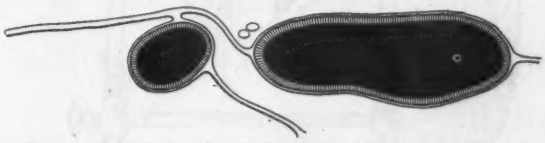

Fig. I. A vertical and sagittal cut, showing the stomach, transverse colon, the mesocolon and great omentum, which is loosely adherent and without blood-vessels at its insertion to the transverse colon.

4. *The new method of Lardennois, Okinczyc and Pauchet,* to the description of which this paper is now devoted, is incomparably superior to the others, being easy, rapid and benign: it has been named epiplo-enterocolic and consists of separating the

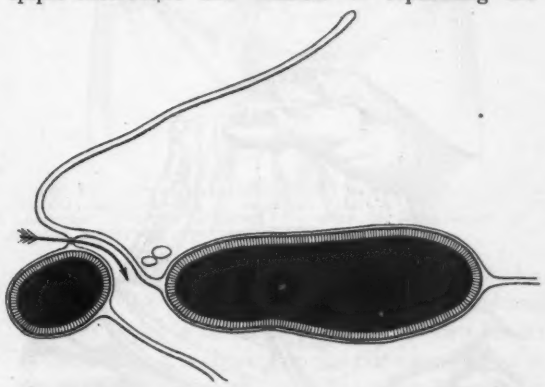

Fig. I-A. Shows the manner of lifting the great omentum and the point at which it should be separated from the transverse colon, without hemorrhage.

greater omentum with its mesentery, from the transverse colon.

By reference to the schematic figures I, I-A, and II, representing the greater omentum, stomach and transverse colon, with its mesentery, the reader will see how the posterior aspect of the stomach is exposed in its entirety, with free access to the epiploic cavity.

The technic of the procedure is simple, but requires care in manipulation.

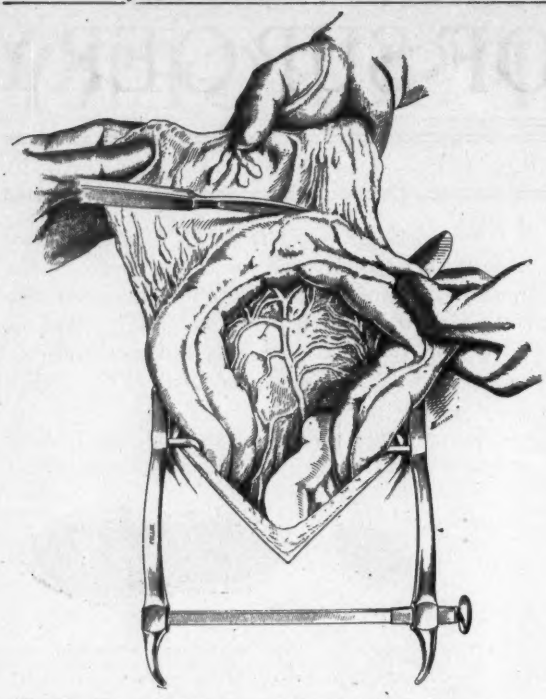

Fig. II. The abdomen is opened and held so by the retractors of Gosset, the epiploic insertion into the transverse colon is being separated by the point of the bistoury.

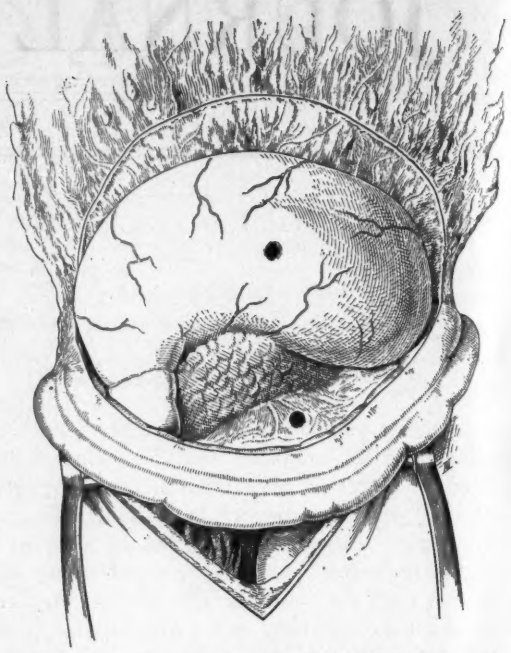

Fig. IV. The great omentum completely separated from the transverse colon, is lifted up with the stomach, when a wound of the posterior face can be easily repaired. The pancreas is shown between the stomach and transverse colon. The duodenum is brought into view at the pyloris end.

Fig. III. The intercolo-epiploic incision once started by the bistoury is continued by aid of a tampon of gauze mounted upon the forceps, along the black line. When the great omentum is completely separated from the transverse colon, it is lifted up, and with it the stomach.

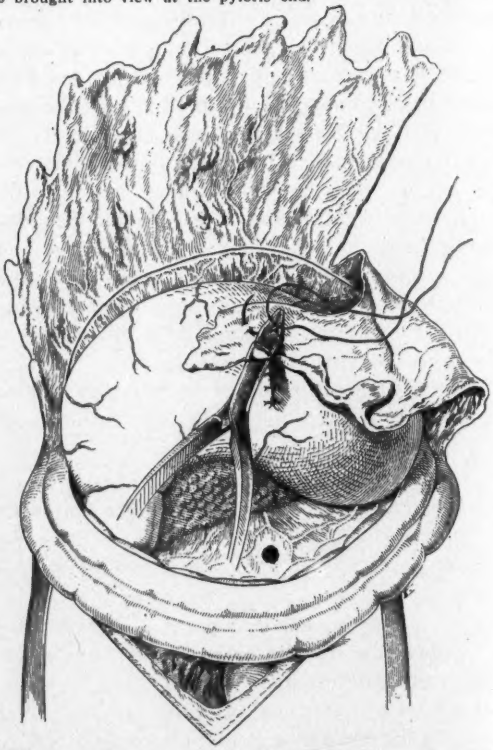

Fig. V. Shows the reinforcement of the repaired gunshot wound, by a fold of the omentum. The remainder of the great omentum is pushed into the posterior epiploic cavity. The transverse colon is sutured directly to the great curvature of the stomach at the line of insertion of the great omentum.

After opening the abdominal cavity, with the point of the bistoury, scratch an opening in the serous membrane of the transverse colon at its juncture with the greater omentum, then with a tampon of gauze mounted upon a forceps, gradually separate the one from the other (fig. III) the full length of the insertion; this should be done without tearing and will prove to be free from all hemorrhage. By lifting up the apron of the omentum thus freed, the posterior face of the stomach comes into full view, as well as the pancreas and duodenum, as the transverse meso-colon with its vascular arcades is pushed downward.

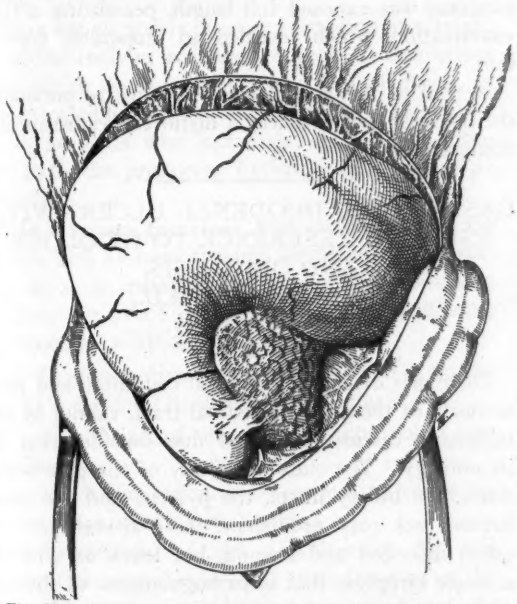

Fig. VI. Shows an ulcer of the duodenum, adherent to the pancreas, not recognized in an exploration of the anterior surface of the stomach, made perfectly visible after the intercolo-epiploic separation.

The operator who avails himself once of this route will frequently practice it in a variety of conditions.

1. *Exploration of the stomach and duodenum.*—Professor Pauchet, in a recent communication,* said: "Formerly when I operated upon a subject supposed to be suffering some gastric trouble, I opened the abdomen, examined the pylorus and anterior aspect of the small curvature of the stomach, and if my fingers and eyes found nothing, I concluded there was an error of diagnosis, and I missed the real trouble."

"Since I have practiced the intero-colo-epiploic separation, it frequently occurs that I find by exploring the posterior face of the stomach, an ulcer there or of the duodenum, which might otherwise have remained hidden." (fig. VI.)

2. *For gun-shot wounds.*—The wound of the anterior face of the stomach is found and sutured: then the operator opens into the posterior cavity by the intero-colo-epiploic separation, finds and fixes the posterior wound by a Volsellum forceps, or by two sustaining threads, in order to close the opening by four separated sutures, after which the free border of the omentum is sutured to reinforce the repair. (figs. IV, V.)

The posterior epiploic cavity is carefully swabbed

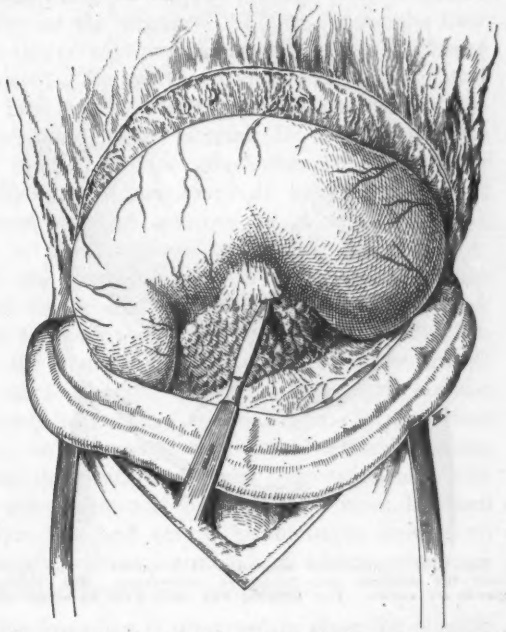

Fig. VII. Shows the facility with which an ulcer of the smaller curvature can be separated from its adherence to the pancreas. After its liberation, the ulcer can be resected, or a partial gastrectomy can be performed.

out with a tampon, wet with warm saline solution or ether; the greater omentum is then introduced into this cavity in its entirety and the inferior border of the stomach is sutured to the transverse colon at the line of its separation from the epiploic insertion. The greater omentum thus abandoned in the posterior cavity acts in phagacytosis and replaces drainage.

3. *Ulcers of the lesser curvature and posterior face of the stomach.*—Gastric ulcers repair best if they are resected. Resection is easy if the ulcer is located at the level of the pylorus. They are more delicate and difficult if they occur upon the lesser curvature or posterior gastric face, and especially so if found high up near the cardiac opening.

By this new route, it is comparatively easy to find the hidden ulcer, and it is a boon to the surgeon

* Bulletins et mémoires de la Société de Chirurgie de Paris, May 10, 1916.

when inflammatory adhesions must be separated. The ulcer once liberated can be resected, but if the surrounding surfaces are much inflamed, it is better to perform a partial gastrectomy, which will be found to be less grave and more efficacious.

4. *Dissection for cancer of the pylorus.*—The diagnosis once made and the surgeon once in the midst of an operation for this condition, should not substitute a gastro-enterostomy for a radical operation, except he finds a metastasis of the peritoneum, or in the lumbar glands. Some operators decide upon a gastro-enterostomy when they find the tumor adherent to the pancreas: (fig. VII.) as this condition is almost constantly inflammatory, this substitution is to be regretted.

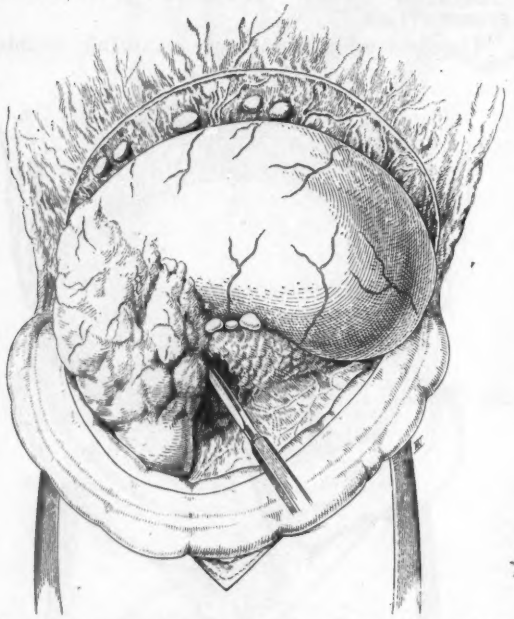

Fig. VIII. Shows the separation of a cancer of the pylorus from the pancreas and transverse meso-colon. The enlarged glands are shown. This drawing was made from an actual case.

By systematically practicing the intercolo-epiploic separation in the presence of cancer of the pylorus, the surgeon arrives directly upon the tumor and can separate it from its adhesions with a facility equal to an organ superficially located in the abdomen. If pancreatic adhesions exist, they cannot only be separated under the eye, but the colica media artery can be more readily recognized and protected. (fig. VIII.)

By this route, the liberation of the stomach and the tumor, constituting the first period of the operation, is greatly facilitated, and the stomach, freed from its colic and mesocolic attachments, can be freely lifted, affording an open field in which to proceed with the succeeding steps of the operation.

5. *Operations upon the pancreas.*—By this route the pancreas is laid open to its full length. I saw Professor Pauchet operate upon a patient in the service of Dr. Walther in La Pitié Hospital, where the diagnosis of a tumor of the pancreas had been made by the Chef de Clinique and Professor Arrou.

By a double paravertebral injection of novacain-epinephrin, Corbière, producing complete anesthesia of the epigastrium and the visceral contents, he was enabled to perform a laparotomy without the aid of ether or chloroform, and with complete absence of pain to the patient.

After making the colo-epiploic separation, the pancreas was exposed full length, permitting a full examination, which revealed an inoperable condition.

A trial of this new route will serve to persuade the operator that it marks a distinct advance in abdominal surgery.

GASTRIC AND DUODENAL ULCER: WITH ESPECIAL REFERENCE TO ETIOLOGY AND DIAGNOSIS.

C. W. DOWDEN, M.D.,
LOUISVILLE, KY.

Diagnosis of any pathological condition, and particularly of the gastro-intestinal tract, cannot be intelligently discussed without due consideration of its etiology. The close proximity of the pancreatic ducts, the biliary ducts, the pylorus and the duodenum, not only predispose these tissues to frequent infection and trauma, but leave us without a *single* symptom that is pathognomonic of disease of any one.

Lesions of the stomach and duodenum do *not* consist of the large number of ulcers that we have been led to believe the past few years. In this section of the country especially, ulcers of the stomach and duodenum form a comparatively small percentage of the digestive disturbances we encounter, in contradistinction to the teachings and writings of many capable men the past five years. Where ulcer *does* exist, and I say it without reservation, it is *not a disease* but a symptom. A symptom of what, one may ask? I would say a symptom of any condition that will produce pyloric obstruction, organically or spasmodically, and this condition may be present in the pancreas, in the appendix, in the colon, the prostate, the teeth, gums, nasal sinuses, in the blood stream itself, and last and probably of greatest frequency, in the liver and its adnexa. Experimental ulcer has been recently produced in the following ways:[1]

(1) By section of the spinal cord, and after that, introducing strong HCl. into the stomach (Koch and Ewald);

(2) By trauma and thermic irritation (Ritter and Decker);

(3) By producing hemaglobinuria (Silberman);

(4) By bleeding animals to severe anemia (Quincke);

(5) By injecting an emulsion of wax particles into central portion of the femoral artery (Pannum);

(6) By injecting a suspension of chromate of lead into the splenic or gastric interior (O. Cohnheim).

These are all proofs of ulcer formation in animals, but undoubtedly in man many superficial ulcerations occur which do not develop into typical ulcers, as demonstrated by the hemorrhagic areas in alcoholics, and in acrobats who introduce sharp bodies into their stomachs producing follicular swelling but no ulcerations.

It would seem, therefore, that factors outside the stomach and of constitutional origin must be causative, in some instances at least, in the production of ulcer. In proof of this we have the following experimental work to support us:[1]

(1) Demonstration of bacteria in colonies on the floor of the ulcer (Boetcher and Latulae);

(2) Production of ulcer by injecting colon bacilli (Turck);

(3) Production of ulcer by cutting the vagus below the diaphragm (Von Yzeran);

(4) Production of ulcer by ligating the left branch of the portal vein—due to disfunction of the liver. Of course, in addition local atrophy of the liver occurred. From this it was concluded that normally there are toxic substances formed which are rendered non-poisonous by the normal functionating liver. If the liver cells are diseased this disintoxication cannot be accomplished. The fact that through injection of liver extract ulcus ventriculi or intestinal bleeding may be produced, is proof of the toxic influence of the dead liver cells (Gunderman). Many attribute ulcer to disease outside of the stomach (chronic appendicitis, gall bladder disease, chronic obstipation), which by way of visceral nerves causes contractions of the musculature of the stomach, thus leading to ischemia and ulcer formation, and also hemorrhages of small vessels.

While there remains a difference of opinion as to how ulcer is produced, in the main all agree that in order to have ulcer produced occlusion of the local blood supply with ischemia is necessary. That this condition may be brought about in a number of ways, a great variety of experimental work has proven. That this occlusion is a result of spastic contractions of the pylorus in many instance is proven by *x*-ray demonstration of pylorospasm, etc., and in an experimental way by Hamburger[2] in his recent work in constricting the pylorus to various degrees of obstruction. The question of auto-digestion after the lesion is once produced has been widely debated. It is known, however, that in addition to the pancreas, the stomach contains an active proteolytic enzyme which unrestrained is capable of destroying tissue where there is an impaired vitality of the mucosa. Whether or not the liver may also contain such an enzyme I have not heard discussed. The work of Gunderman, however, and the fact that by injecting liver extract ulcer can be produced, would account for many conditions that have heretofore gone unexplained. I refer particularly to those cases of gastric hemorrhage without further evidence of ulcer. We have had a few of these cases come to operation, and the only lesion shown was adhesions about the pylorus and duodenum, sufficient, however, to allow more or less backward flow of bile into the stomach under various conditions; and if, as seems possible, there is a proteolytic enzyme present, hemorrhage would follow. With a tendency to chronicity, ulcer would naturally ensue. I have three such cases under observation now, with not one symptom of digestive disturbance, but each patient has had severe hemorrhages coming on suddenly without warning, and without symptoms of gastric disturbance following.

The foregoing is presented to show the possible cause of ulcer, and to prove that there *is* a preulcer stage which in a majority of instances is medical, and that prophylaxis is of the very greatest importance in preventing ulcer formation. Comfortable existence in America (from the standpoint of finance) means hasty eating, overeating without consideration for quality, insufficient rest after meals, relaxation, both mental and physical, neglect of daily evacuation of the intestinal tract, etc. This in turn means hyperacidity, hypersecretion, weakening of the stomach muscles, and eventually ulcer through the process before mentioned. Once, however, ulcer is formed its presence should be determined early, and to do this it is necessary to avail ourselves of all the various diagnostic methods, and even then a large number of errors will result.

It was my privilege to study a series of 420 cases of ulcer of the stomach and duodenum prior to 1915. Many cases have since been studied and fol-

lowed through operation, but the statistics of later cases have not been compiled. Of the 420 cases in this series, there are certainly many diagnostic errors. However, those errors occurring after using all the various diagnostic methods are in a degree excusable.

In the study incident to the compilation of these statistics, I have been firmly convinced that an appreciation of the etiology and a proper interpretation of symptoms obtained, not from *one* method of diagnosis, but from *all*, is necessary before an intelligent line of treatment can be prescribed, either medically or surgically. That all ulcers of the stomach and duodenum do become surgical if not properly treated can admit of no doubt. That all ulcers which have become surgical have gone through a stage in which careful hygienic and dietetic measures would have effected a cure, thus obviating surgery, has equally impressed me. This being the case, there is a medical stage of ulcer which is extremely difficult of diagnosis, and is usually treated simply as "dyspepsia" or indigestion. On the other hand is the surgical stage in which the symptoms have persisted until the typical ulcer has developed, and medical measures are worse than useless because they do not cure, and the patient through a mistaken idea of temporary relief for permanent cure at least suffers one of the several sequelæ, the most frequent and serious of which is carcinoma. I would, therefore, urge earlier diagnosis of this condition, which, in a large percentage of cases, can be done with the necessary laboratory and *x*-ray aids.

Of the 425 cases here reported 277 were males and 148 females. The following table shows that more people were affected between the ages of thirty-five and fifty, but on account of the frequently long duration of ulcer I doubt the value of such statistics, since many patients above forty have had symptoms from ten to twenty years and just as properly belong to another period.

TABLE NO. 1.

Age: 10 to 20	8	1.8%
20 to 35	127	30%
35 to 50	208	49%
50 to 60	51	12%
Over 60	31	7.3%

Of this number 306 (72%) had lost weight (up to 50 lbs.), 107 (25%) had remained stationary, and in 12 (2.9%) there was a gain of weight; 269 (63.3%) appeared healthy, and 156 (36.7%) were sickly.

In support of the theory that infections play a part in the production of ulcer, table No. 2 will be found interesting:

TABLE NO. 2.

	No. of cases.	Occurrence of digestive disturbance.
Rheumatism	24 or 8%	Within two weeks
Throat infections	11 or 2.6%	"
Grippe	11 or 2.6%	"
Diarrhea	5 or 1.1%	"
Appendicitis	7 or 1.6%	"
Neuritis	2 or 0.5%	"
Puerperal fever	11 or 2.6%	"
Acute Nephritis	5 or 1.1%	"
Ptomaine poisoning	9 or 2.1%	"
Tenia	3 or 0.7%	"
Associated with		
Diphtheria, yellow fever, septicemia, pancreatitis, gonorrhea, colitis, peritonitis, parotitis, cystitis, chorea, abscess (one each)	11	Immediately
Typhoid fever	22 or 5.2%	Two weeks to 30 years
Malaria	8 or 1.9%	Indefinite
Heart lesions	12 or 2.8%	"
Syphilis	9 or 2.1%	"
Pneumonia	5 or 1.1%	Immediately to 4 years
Tuberculosis	5 or 1.1%	Indefinite
Total	170 or 40%	Infections
Alcoholic	20	Immediately
Injury	8	"
Over-exertion	3	"
Operation (other conditions)	10	"
Nervous shock	3	
Foreign body, drugs, angina, diabetes (one each)	4	

As far as I was able to determine, the other cases started in with some digestive disturbance for which the patient could not account other than, in a majority of instances, by a heavy, indigestible meal. It seems quite reasonable where indigestion was the primary symptom, that a simple abrasion from dietary indiscretion was the beginning, and a subsequent infection was responsible for the ulcer. The metastatic infections from the streptococci occur within twenty-four to thirty-six hours, would indicate that those cases following throat infections, rheumatism, grippe, etc., were metastatic manifestations. Metastases from typhoid fever, pneumonia, tuberculosis, syphilis, etc., are very indefinite, and such is the case in this series. In connection with the valuable experimental work that has been done, to me the figures are at least significant. It might be interesting to note at this time that of the 425 cases, constipation was present 277 times (65+ %), and diarrhea but five times, a little more than 1%. Whether this is cause or result I am unable to say, but I believe it to be an etiological factor. In this series, as has often been pointed out by other observers, the most frequent time of occurrence is in the spring and fall. That organic lesions are rare in the asthenic habitus is evident from the fact that in the 425 cases the enteroptotic habitus was present in only 80 and the normal in 345 or over 81%. Indeed, I am of the opinion that what errors in diagnosis exist in this series would be found in the 80 cases of ptosis, in which the manifold symptoms of this condition are often quite similar to those of ulcer.

To my mind, one of the most forceful arguments against snapshot diagnoses is the number of cases

operated upon yearly for other conditions, and after which the symptoms persist. That a competent surgeon would not leave any pathologic condition in the abdomen is true, but the following table would indicate that all surgery is not competent:

TABLE NO. 3.

Operation.	Number	Results.
Appendicitis	12	No relief
Gall bladder drainage	6	"
Ovariotomy	3	"
Curettage	3	"
Gastro-enterostomy	1	"
Gastro-enterostomy	1	Partial relief
Perineorrhaphy	2	No relief
Duodenal ulcer	1	Partial relief
Hemorrhoids	3	No relief
Fixation of abdominal organs	1	"
Total	33	or more than 7.5%

A complete examination of these 33 cases left no reasonable doubt as to the probability of ulcer.

While the anamnesis is of the greatest importance in diagnosis, the foregoing table would indicate that it is not sufficient and the physician or surgeon who depends upon this alone is likely to fall into many errors. That diseases of the gall bladder, pancreas, appendix, etc., produce symptoms similar to those of gastric and duodenal ulcer we all know, and the anamnesis should do no more than in a general way to locate a pathological condition in the abdominal cavity. Just which organ is affected must be determined by other and more accurate diagnostic methods. It is the most important spoke in the diagnostic wheel, because if properly secured it tells us of the presence of trouble, but it does not locate it. In my series an attempt has been made to classify pain as far as possible. Distension from gas is classified separately and is the most constant of all symptoms, as it is also in gall bladder lesions:

Distension and pressure symptoms	368	or 86.6%
Pain not classified	78	
Gnawing	28	
Burning	125	
Cramping	20	
Sourness	91	

This makes a total of 251 cases, or 59%, that actually complained of pain. In 353, or 83%, belching was a constant symptom.

Symptoms occurring more than two hours after eating.	195	or 46%
Symptoms occurring less than two hours after eating.	147	or 34.6%
Symptoms occurring irregularly	49	or 11.5%
Symptoms occurring during the night also	70	or 16.5%
Relieved by eating in	208	or 49%
Aggravated by eating in	157	or 37%
Eating bore no relation in	60	or 14%

If the time of occurrence of symptoms after eating is an index to the location of the lesion, then we have in 195, or 46%, a probability of duodenal ulcer, and in 147, or 34%, a probability of gastric ulcer. While a fairly reliable index, it is by no means constant, and not comparable to other means for location of the lesion. Clinical observation proves that the time of pain depends upon a number of factors, size of the ulcer, quality and quantity of food, and whether one or the other ostium of the stomach is sympathetically involved in aggravating the pain. After a light meal, independent of the site of ulcer, pain occurs one or two hours later, and after a heavier meal three or four hours later.[1]

Just what significance food relief and food aggravation may have, I am unable to say. The general impression has been that by combining the free hydrochloric acid we thus remove the irritation, and the pain or distress is relieved. I have seen several cases which suffered pain, burning, etc., two or more hours after meals, and were promptly relieved by an alkaline powder, a cracker, or even water. There was occult blood in the stools, and all the roentgenograms showed distinct evidence of ulcer; yet the gastric analysis showed a total absence of free hydrochloric acid and the combined acid running about 10.

That pain is due to tugging on the parietal peritoneum, the result of peristaltic contraction to rid the stomach or duodenum of a lesion, is to my mind the most logical conclusion. The cervix of the uterus, the cervix of the gall bladder (or cystic duct), the cervix of the urinary bladder, etc., are all alike in this respect. A lesion at this point produces hypersecretion, painful contractures and tenesmus which are not present in other portions of the organ. In my experience ulcers of the greater curvature have not been accompanied by much pain, even when perforation has taken place, as has been demonstrated in two cases by surgery. Food relief is obtained for the same reason that vomiting is comparatively easy and painless, when there is plenty of contents to be evacuated. When this is accomplished, however, and the violent wrenching persists, the process becomes painful and annoying. Of much greater importance than the time pain appears is the presence of localized tenderness. In this series it was present in 344 cases, or 81%. While it is true that lesions of the pancreas, gall bladder, and appendages will give painful areas, their constant presence mean a pathological condition, and other methods must be employed to eliminate the unoffending organs.

Laboratory Methods: The chief value of gastric analysis is to afford an intelligent idea of proper dietetic treatment. As a diagnostic aid it is probably of some subsidiary importance, but in comparing analysis in 220 cases with a similar number of

analyses for other conditions, there is hardly sufficient difference to use this as a strong diagnostic guide. The total contents of the stomach (method of Mathieu) is probably of some significance in determining obstruction, but not as reliable as the raisin-meal or a residue six hours or more after the bismuth-buttermilk-meal. Occult blood in the gastric contents is valueless unless the tube is passed with great care and there has been little or no retching or gagging by the patient.

Appearances	Acidities:	Combined HCl.:
Bile stain 11=5%	Normal 43=1.5%	Above 10
Mucous 102=46%	Hyperchlorhydria 136=62%	146=66.4%
Vis. blood 19=8.6%	Subacid 25=11.4%	Below 10
Normal 93=42%	Achylia 16=7.2%	74=33.6%
Hyperchlorhydria	Free HCl above 50	
Occult Blood: 155=70.5%		Lactic Acid: 58=26.3%

Fecal analysis: The presence of occult blood in the feces is of great diagnostic importance, provided care be taken to eliminate those things from the diet known to cause a positive reaction. It should be remembered also that ulcers do not bleed continuously, and repeated tests should be made from day to day. Small bleeding hemorrhoids should, of course, be considered. In 77 examinations made, occult blood was found in 43, or 56%. This is not a fair estimate, however, since in many instances we do not have our patients under observation long enough to determine this point. Three tests are always used, the benzidin, guaiac, and aloin, the benzidin being much more delicate.

The urine was analyzed in all of the 425 cases. It is frequently valuable in making a differential diagnosis, but there is nothing to point to disease of the stomach or intestines notwithstanding all that has been said and written concerning indicanuria. The constant presence of bile in the urine is of course in favor of disturbed liver function. The Cammidge reaction has been the cause of our diagnosing a pancreatic lesion in several instances where without it we should have diagnosed ulcer. The trypsin test of both the stomach contents and feces after oil, is also a valuable aid to the diagnosis of pancreatic lesions.

Blood analysis: Friedman[3] claims that in duodenal ulcer polycythemia is frequent, and anemia rare; and the reverse true in gastric ulcer. A study of the blood in 77 cases does not conform with this, in fact there is nothing of value other than possibly a leucocytosis such as one would get from an active lesion located in the cervix of any organ where the blood supply, lymphatics, etc., are richest. I do believe, however, that a leucocytosis is an aid in localizing the lesion at the cervix of the organ. Just why the blood picture should vary here from similar lesions elsewhere, I am unable to see from a histological standpoint. The average hemoglobin in this series was 72.2%, and the average R. B. C. 4,600,650.

Friedman states a fact that he has noted in his observations without attempting to explain the reasons therefor. In support of my theory that the liver is responsible in many instances (if not all) for the production of ulcer of the duodenum, I should like to refer to the excellent scientific research work done by Paul D. Lamson[4] in the Pharmacological Laboratory of the Johns Hopkins University, of Baltimore, and reported in the *Journal of Pharmacology and Experimental Therapeutics* under the head of "The Rôle of the Liver in Acute Polycythemia." He shows that by injection of epinephrin in proportion of .9 mg. per kilo, that polycythemia is produced. Experiments were made to ascertain the part played by various organs in the production of polycythemia. This was done by removal of the organs where possible, and in other instances by "cutting off" the organ from the general circulation. The intestine, its mesentery and the omentum, the spleen, the pancreas, bone marrow, muscles, lungs, kidneys and skin were shown to have no control whatever over the production of polycythemia; when, however, the liver was "cut off" from the circulation, the polycythemia was immediately stopped or prevented after injection of epinephrin. The following is his summary verbatim:

(1) The red corpuscle content of the blood is a constantly varying quantity under physiological conditions;

(2) Certain new means have been found by which the red count may be rapidly and greatly increased;

(a) Lung emboli produced by the injection of corpuscles hardened with formaldehyde, or an inert powder, as lycopodium, or of oil;

(b) Emotional stimuli, as fright and rage;

(3) The polycythemia produced by the injection of epinephrin is due to the action of the liver alone;

(4) Ligature of the arterial blood supply to the liver excludes the production of polycythemia after the injection of epinephrin;

(5) Later release of this ligature allows the customary increase in number of red cells to take place without the further injection of epinephrin;

(6) The liver effects this increase in number of red cells by:

(a) A decrease in plasma volume, not sufficient to account for the entire increase in the number of red cells, however;

(b) By bringing into the circulation red cells which were not present before the production of polycythemia as shown by (1) their reduced size; (2) their reduced percentage hemoglobin content;

(7) These cells give none of the usual reaction of young cells. There is an absence of nucleated red cells, no change in the fragility of the corpuscles, and no increased metabolism of the red cells themselves, as shown by an increased rate of reduction;

(8) It is concluded that there is a mechanism for the regulation of the red corpuscle content of the blood;

(9) That the regulatory mechanism is under nervous control, reacting to lack of oxygen as a stimulus;

(10) That the adrenal glands play a part in this mechanism;

(11) That the liver is the organ which supplies the body with red cells to meet its acute demands.

What polycythemia is present in duodenal ulcer is therefore dependent upon the liver mechanism, and this proves conclusively to my mind that duodenal ulcer is dependent to a degree upon the liver for its production.

The chief value of the blood count is in differentiating medical from surgical conditions. I am convinced that this procedure is more often responsible for indicating the necessity of surgery than any other single diagnostic method. It is simple, consumes but little time, and if it were universally employed, I am sure would be the means of saving hundreds of lives every year.

Roentgen rays: The final step in the diagnosis, and the one of greatest importance to my mind, as far as the patient is concerned, is the examination with the roentgen rays. If an ulcer cannot be demonstrated in this manner, I do not believe that it is surgical. An ulcer that has advanced to the point where a defect is constantly shown on the radiogram, has involved more than one coat of the gastric mucosa and the time has passed for a complete restoration of tissue and normal function by medicinal or hygienic measures. It is the one absolute method by which we can differentiate a medical from a surgical ulcer. Even copious hemorrhage from the stomach and intestines is *not* a surgical indication, unless the roentgenogram shows a defect. I have had three such cases, in which the hemorrhage was almost fatal; but the recovery was complete, and no evidence remained of gastrointestinal disturbance. In one case a similar hemorrhage occurred almost eight years before, after a heavy meal. There were no symptoms before or after to indicate the presence of ulcer. I recall distinctly, in my service with Dr. Pick, of Berlin, seeing several pathological specimens of numerous varicosities of the venous plexus of the wall of the intestines, and some of them ruptured, producing hemorrhage. There were no varicosities elsewhere.

In our list of 425 cases, 83 have been studied on the fluoroscopic screen and radiographically after the bismuth-buttermilk-meal. A combination of the various methods have been used. We believe that a surgical lesion can always be demonstrated. An adhesion may be called an ulcer, and a pancreatitis may be called an ulcer, but they are surgical lesions nevertheless and the error is negligible so far as treatment is concerned. In the hands of a capable roentgenologist (and roentgenology is an extremely scientific art), I believe the information obtained is but little less reliable than that obtained from exploratory celiotomy. The absence of radiographic evidence of ulcer does not indicate the absence of ulcer by any means, but it surely indicates the presence of a medical and not a surgical condition. The indirect method as advocated by Carman in this country is valuable evidence in the diagnosis of medical ulcer. The following table is presented for study:

ROENTGENOLOGICAL FINDINGS, 83 CASES.

Filling defects (Stomach)	25
Incisura	4
Residue (6 hours)	38

	Opening.			Patency.		
	Immediate.	Delayed.	Not Seen.	Free.	Obstr.	Gaping.
Pylorus	20	56	7	52	28	3

	Position.			Form.		
	Normal.	Vertical.	Oblique.	Transverse.	F. Hook.	T. Hook.	S. Horn.
	30	41	10	2	42	27	14

	Peristalsis.					Duodenal Cap.		
	Normal.	Active.	Vigorous.	None.	Weak.	Regular.	Irregular.	Not Seen.
	23	21	25	10	4	14	59	10

	Tonus.			Size.			
	Hyper.	Hypo.	Ortho.	Small.	Med.	Large.	Very Large.
	20	15	48	1	31	33	18

	Tender Points.						
	Duodenal.	Pyloric.	Gall Bladder.	Epigastric.	Greater Curvature.	Lesser Curvature.	O.	McBurney's Point.
	48	22	15	9	1	4	7	2

After all diagnostic methods have been employed, I am sorry to say that even then a very large percentage of errors will result. A few years ago the statement was published that covering a period of years at the Massachusetts General Hospital, the records of that institution showed that only thirty some odd per cent. of the cases admitted were properly diagnosed as proven at autopsy. Just think

of it, and this one of the greatest diagnostic institutions in the country! This should not only furnish us with much consolation, but should spur us on to greater efforts and more accurate methods.

In concluding, then, I would emphasize the following points particularly: There is sufficient evidence, both experimental and otherwise, to warrant the belief that the liver plays a very great part in the production of gastric and duodenal ulcer (the latter particularly) through its failure to render non-poisonous toxic substances which are formed there, due to disease of the liver cells themselves. The possibility also of a proteolytic enzyme which under certain conditions when unrestrained produces destruction of mucous surfaces. Mark this prediction, however, that in the near future a much closer relationship will develop between diseases of the liver and lesions about the pylorus and duodenum.

Let us not forget, either, that a differentiation between gastric and duodenal ulcer is most important, as opposed to the general belief. Gastric ulcers go on to scar formation and obstruction and frequently cancer, and duodenal ulcers usually to perforation,[1] so in the latter case if medical treatment is not quickly successful surgical treatment should be advised.

Finally, the medical treatment: This in the majority of instances concerns the pre-ulcer stage, and should be prophylactic. The people should be directed to partake of only two substantial meals daily, one in the morning, consisting of fruit, cereal, light coffee, bread and butter; only a light lunch at noontime, and the second chief meal at six o'clock, consisting of soups, plainly prepared fish or meats, fresh green vegetables, cooked fruits, and light puddings. Overeating and hasty eating is to be avoided.[1] Sufficient rest must be taken after meals. Both mental and physical relaxation is important, and daily evacuation of the intestinal contents is imperative.

This latter point suggests the subject of focal infection, without which in this day of fads no medical discussion is complete. Let me say, however, that all foci of infection should be vigorously sought and removed, regardless of any single lesion, for the effect on the general health. We have heard much recently about the teeth, tonsils, alveolar processes, etc., being responsible for practically every ailment under the sun, and as a result of this thousands of sound, useful teeth, and thousands of healthy tonsils are being sacrificed. The pendulum is swinging too far, and we are losing our common sense and judgment. We have been curing disease for hundreds of years and the only focus of infection removed was in the colon, and since the days of Hippocrates the cardinal principle of medicine has been elimination. Personally I do not believe that diseased teeth, tonsils, etc., are directly responsible for disease anywhere. Bad teeth are not primary in themselves; they depend upon faulty nutrition. A child with faulty digestion and suffering generally from malnutrition, is most likely to have bad teeth. The same rule applies to the adult. Good digestion and thorough elimination are conducive not only to good teeth, but to good health generally.

I think I can safely say that bad teeth, bad tonsils, etc., are the result of faulty nutrition, depending upon improper food, improper elimination, and improper absorption, brought about by primary derangement of the gastrointestinal tract; and is not this probably true of the other so-called "foci"? Are they primary? No matter from what infection we may suffer, the intestinal tract is called upon to do more work than any other organ of the body and must suffer. Remember that all of our waste matter, which is subject to all forms of bacterial life from within and without, passes through the colon. It is subject to irritants, to trauma, and to all forms of abuse. Then recall that the blood receives much of its nourishment through the same medium by the process of osmosis, and nature intended this supply to be pure. It does not require a very great stretch of the imagination to believe that impurities as well as bacteria enter the blood stream from the intestinal tract, and that infections of the teeth, tonsils, the alveoli, etc., *are not primary*, but on account of their construction and susceptibility are the first to suffer from an infectcion which arises primarily where? In that organ, which has two severely antagonistic rôles to play in the human economy—*the colon.*

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After resection of the sigmoid it is desirable to leave a tube in the bowel, passed up through the rectum before the abdomen is closed. If a piece of rubber dam is placed on each side of the gut and brought out through the wound it will provide a safe outlet in case of leakage.

CRANIAL FRACTURES.

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While the subject of fractures in other anatomic situations has been extensively studied and elaborated in surgical literature during the last year or two, little information of practical importance has been added to existing knowledge concerning fracture of the cranial bones. Casual search of available English literature of the present year (1916) reveals only three or four contributions of any consequence dealing with fractures of the cranium.

The skull has been described as "a superior expansion of the vertebral column, as if composed of four vertebræ the elementary parts of which are especially modified in form and size and almost immovably connected, for the reception of the brain and special organs of sense." The major portion of the cranium is composed of eight sections known anatomically as: (a) the occipital, (b) the two parietal, (c) the frontal, (d) the two temporal, (e) the sphenoid, and (f) the ethmoid bones, any one or more of which may be fractured by external violence provided it be of sufficient severity.

Regardless of the anatomic situation involved, cranial fractures according to their character and extent may be single or multiple, and are classified as: (a) linear, (b) fissured, (c) stellate, (d) depressed, (e) compound, (f) comminuted, and (g) perforative. Clinically they are divided into: (1) fractures of the vault, and (2) those of the base of the skull.

Fractures of the vault are usually the result of direct traumatism externally inflicted. The extent and character of the osseous damage will depend largely upon the anatomic location and the force and direction of the instrument inflicting the trauma, *e. g.*, a direct blow upon the skull with a hammer or other blunt weapon will produce injury of a character entirely different from that due to a fall with impingement of the head upon some solid object. Therefore, from the standpoint of both diagnosis and treatment, it is of the utmost importance to ascertain in every instance the manner in which the trauma was inflicted. Moreover, the anatomic facts must also be remembered: (a) that the cranial structure (excepting at the base) consists of two osseous layers, familiarly known as the outer and inner tables; (b) that fracture may involve either one or both these layers (in the mastoid and frontal regions, only); (c) that fracture of the inner without visible lesion of the outer table is not unknown. "The lines of fracture on the outside of a given skull are seldom any index as to what may be found on its inner surface."

It may be stated as a general proposition that as to causation basal fractures differ in no essential respect from those of the vault. Fractures of the base are much more frequent than hitherto believed, and a large percentage of vault fractures extend to the base; thus in an analysis of 470 cases Brun found basal and vault lesions associated in 75 per cent.; in Besley's series of 1,000 clinical cases such an association was recognized in only 33 per cent., "showing the difficulties of diagnosis of the exact location of the line of fracture." However, in seventy-four cases which came to necropsy both types were found associated in fifty-four, or 72.9 per cent.

Practically all the older and many modern surgical text-books contain the statement that vault fractures are exceedingly common in comparison with those of the base, an observation which is contrary to the clinical experience of most present-day surgeons. The multiplicity of motor driven vehicles, and the numerous accidents incident to the reckless manner of their operation, has caused a tremendous increase in the number of basal fractures. My experience in this respect may have been unique, but in nearly every head injury the result of automobile accident coming under my personal observation during the last few years, there has been fracture at the base of the skull. Some of the patients have recovered without operative intervention, others have been operated upon and recovered, still others have died without regaining consciousness. Thus it may be seen that while basal fractures may be legitimately considered as more serious than those involving the vault alone, the outcome with or without treatment is not invariably fatal as was formerly quite generally believed.

It is claimed by some observers that counter pressure from the atlas coincident with a blow upon the cranial summit, may cause extension of the line of fracture to the base of the skull and that the only way the basal lesion can be detected in such cases is by the employment of roëntgenography and fluoroscopy. According to Besley the present and accepted theories regarding the mechanism of the production of cranial fracture are based upon and embody two definite principles: (1) The inbending of the skull at the point of contact of the blow; (2) the bursting of the skull at a point some distance from the applied force.

The multitudinous and varied symptomatology of cranial fractures is so generally understood that repetition may appear supererogatory but brief out-

lines may be permissible. And in this connection it seems appropriate to reiterate the dictum that the damage sustained by the osseous structure, *per se*, is of comparatively slight consequence in comparison to the cerebral injury.

Both the general and the local symptoms depend largely for their origin upon the anatomic location involved and the extent of injury inflicted upon the cranial contents. Unconsciousness is usually noted immediately following the trauma, and may persist for minutes, hours or days; but as it does not invariably occur after severe injuries, and may follow slight trauma without fracture, its importance as a diagnostic sign in head injuries lies in ascertaining *when* it occurred, how long it lasted and, above all, whether it turned. Severe shock is an almost invariable concomitant. Delirium (even mania) may develop promptly, or may be a late manifestation; likewise headache may be present from the beginning, or be of subsequent development. Vertigo, nausea, vomiting, mental excitement, convulsions, local paralysis, choked disc, stupor, coma, temperature rise without corresponding change in pulse-rate and respiration, are among the manifestations usually observed. The increased intra-cranial pressure from extra-dural or subdural hemorrhage and cerebral edema will explain the development of the majority of the symptoms mentioned.

Obviously the purely focal signs depend entirely upon cerebral laceration or contusion, and hemorrhage with resulting edema and pressure. The artery from which bleeding most frequently occurs is the middle meningeal. In basal fractures free hemorrhage may be noted from the mouth, nose, ears, into the orbital cavity, etc. Spinal fluid may escape from the ears, and more rarely from the nose. In the series of 1,000 cases reported by Besley, blood and spinal fluid escaped from the ears in 316; free bleeding from the mouth and nose in 172; from the nose in 118; from the mouth alone in 53, making a total of 343. It occasionally happens, says Besley, that involvement of one of the cranial nerves may be the only sign present indicating fracture, and that the nerve most commonly injured is the sixth. In his series unilateral facial paralysis occurred thirteen times. The respirations showed nothing characteristic, ranging from 22 to 40, being higher in the fatal than non-fatal cases. The temperature curves were likewise unimportant; in patients who recovered the average was 100° F.; fatal cases, 102° F.; in seven the temperature was above 105° F., in two reaching 107° F. Protrusion of one eye occurred in nine cases. Patellar reflexes increased in 67, absent in 50; no change recorded in others. Babinski reflex observed in 55; Kernig sign in 8; general convulsions in 32; clonic convulsions of arm, 6; leg, 2; face, 7. Rigidity of legs in 29; of the neck, 29. Complete paralysis of facial muscles in 47; legs, 55; arms, 58.

The analysis made by Besley of the pulse-rate and pupillary changes appears sufficiently interesting and instructive to warrant interpolation verbatim:

TABLE 1.—ANALYSIS OF PULSE RATE IN ONE THOUSAND CASES.

Nature of Fracture.	Number of Cases	Average Pulse Rate
1. Fractures of the vault without depression, with recovery (average pulse rate 71)	6	50
	8	60
	14	70
	23	80
	18	90
	14	100 plus
2. Fractures of vault without depression resulting fatally (average pulse rate 113)	1	50
	1	60
	1	80
	1	90
	12	100 plus
3. Fractures of vault with depression with recovery (average pulse rate 92)	1	50
	8	60
	24	70
	39	80
	26	90
	51	100 plus
4. Fractures of vault with depression terminating fatally (average pulse rate 116)	2	40
	3	80
	1	90
	25	100 plus
5. Fractures of base with recovery (average pulse rate 81)	4	50
	16	60
	15	70
	21	80
	13	90
	10	100 plus
6. Fractures of base with death (average pulse rate 105)	1	14
	6	40
	2	50
	9	60
	17	70
	25	80
	22	90
	119	100 plus
	1	200

TABLE 2.—PUPILLARY CHANGES IN ONE THOUSAND CASES.

Pupillary Changes.	Side.	Number.	Average Per Cent.
Dilatation of the pupil...	Left.....	35	19.5
	Right.....	37	
	Unequal pupils.	123	
Loss of light reaction....	Both.....	72	8.5
	Right.....	8	
	Left.....	5	

"In this series of 1,000 cases, vomiting was a common symptom, and occurred in 361, or 36 per cent. of all cases. In eleven cases the vomitus was almost wholly blood."

In the diagnosis of cranial fracture, an accurate clinical history is of the utmost importance. One is able to thus determine the character of the instrument and the manner in which the trauma was inflicted, the approximate force applied, the location and probable extent of the injury. Where extensive laceration of the overlying soft tissues has been produced, with consequent exposure of the osseous structure over a considerable area, the diagnosis is apparent even to the tyro; but where the external tissues have merely sustained contusion, and especially if more or less tumefaction has already ensued, an expert may fail in accurate diagnosis based upon the clinical signs alone. It must be remembered that slight cranial irregularities and even depressions cannot always be identified by palpation

through the overlying integument, and the difficulties are correspondingly intensified by the swelling, edema and exudation which soon supervene.

Too much emphasis has hitherto been placed upon the diagnostic value of the so-called "cracked metal" sound solicited by percussion over the area of supposed fracture. In my experience this sign has seldom been definitely obtainable, and its presence proves nothing.

In every instance where fracture is suspected, regardless of the anatomic location, roëntgenography should be employed, usually supplemented by fluoroscopy. By no other means is it possible for the clinician to be absolutely certain of the correctness or falsity of his provisional conclusions.

The most important—and unfortunately the most unsatisfactory—feature in relation to cranial fractures is the treatment. During the last few years, however, the pessimism exhibited by older authors has been supplanted by more optimistic views, and the *noli me tangere* attitude no longer prevails. Surgical history shows that during periods not far remote, operative invasion of the cranial cavity was considered unjustifiable; and especially in extensive trauma with considerable osseous destruction and with probable corresponding damage to the cerebral tissues, was it believed that the invocation of surgery merely hastened inevitable dissolution. The mortality from serious head injuries was then practically 100 per cent.

The intelligent application of more modern surgical principles has rendered possible marked reduction in the mortality attending cranial as well as nearly all other lesions amenable to operative intervention. In the series of 1,000 clinical cases recorded by Besley the mortality was 53 per cent. In 239 cases of brain injury reported by Sharpe, 227 of which were cranial fractures, the mortality was 30.7 per cent.; and, excluding moribund patients who died within three hours after admission, the mortality was only 19 per cent.

The statement that every patient with cranial fracture should be subjected to operative treatment, would perhaps be further from the truth than the belief of older surgeons that operation should never be undertaken following cerebral trauma. In no department of practice is greater surgical judgment and skill demanded than in cranial and cerebral lesions. In doubtful cases, where the symptoms are obscure and no observable osseous depression exists, the decision to operate or not to operate must be made by the surgeon after due consideration of the clinical and röentgenoscopic findings. In all depressed fractures, with or without immediate symptoms, and in all compound, comminuted and perforative fractures, immediate operation should be performed. However, it must not be forgotten: (a) that rarely compression may result without fracture; (b) that simple linear fracture with extradural or subdural hemorrhage may produce results similar to those due to depressed fracture; (c) that the so-called inner table may be extensively damaged without observable external osseous injury; (d) that the extent of integumental trauma is no index to osseous and cerebral damage.

A safe and conservative rule for general guidance is to operate in every case of cranial fracture in which the symptoms are indicative of cerebral laceration or compression. In vault fractures the opening should be made at the site of injury; in basal fractures requiring surgery the subtemporal decompression operation is the procedure of choice. Drainage is necessary in all operations where the cranial cavity is invaded and the membranes incised.

In cases where palliative treatment seems advisable, or must be practiced to the exclusion of operative methods, absolute rest in bed, the application of ice-bags to the head, purgation, enemata of hot saline solution and black coffee, morphin hypodermatically to assuage pain and promote quietude, will be found the most advantageous measures. Although not strictly a palliative method of treatment, lumbar puncture is oftentimes useful in relieving the increased intracranial pressure resulting from slight edema and hemorrhage; but this procedure is not without danger and should be employed with extreme caution. Fatalities have followed the apparently simple procedure of spinal puncture where the intracranial pressure exceeded that of the fluid in the spinal canal, the vaso-motor centers being overcome from blocking of the foramen magnum resulting in fatal cerebral anemia. However, "if there exist the proper relationship or ratio between intra-cranial pressure and the pressure of the cerebro-spinal fluid, lumbar puncture is comparatively safe." It seems probable that in simple cerebral edema resulting from contusion, with slight increase of intra-cranial pressure, complete relief might be afforded by lumbar puncture alone.

Where the initial symptoms are indicative of more or less serious cerebral damage, early operative intervention is imperatively demanded, *i. e.*, while the pulse-rate remains low, before intra-cranial pressure is markedly increased, before the blood pressure is lowered, and before the dangerous stage of medullary compression and cerebral anemia has been reached. Late operations in cerebral injury due to cranial fracture are for the most part followed by disastrous results. Murphy states that if

the brain be so compressed that its circulation is totally impeded for twelve minutes, the patient will certainly succumb because the brain tissue cannot withstand total anemia for a longer period.

The technic of cranial surgery requires no further amplification, but there are certain features upon which greater emphasis might be placed. The prevention of infection by the most rigid adherence to modern principles of asepsis is one of the primary essentials to a successful outcome. In compound fracture the wound should be thoroughly cleansed before invading the cranial cavity, to minimize the danger of infection from without; if extensive cerebral laceration has occurred, after elevating or removing the damaged osseous structure, the cerebral tissues so devitalized as to be beyond hope of repair should be carefully excised. Adequate provision for drainage is imperative in every instance where the dura is incised, which should be always done if there be evidence of increased subdural pressure. A decompression operation without dural incision rarely accomplishes the desired result.

CASE I. A male, aged thirty-two, was admitted to the Louisville Public Hospital without any history excepting that he had received a head injury in an automobile accident and had been rendered unconscious. He was still unconscious when admitted; his breathing was sterterous, blood issued from his ears, mouth and nose; his pupils did not react to light; pressure upon the supraorbital nerve elicited slight response. Based upon the clinical findings, and especially considering the stuporous condition of the patient, the provisional diagnosis of extensive basal fracture was made, and under the circumstances I refused to operate, as it was believed the injury would prove quickly fatal.

The patient was placed in bed and instructions given that he be carefully watched. After being thoroughly cleansed with alcohol, his aural cavities were "plugged" with pledgets of sterile cotton. There was considerable subconjunctival hemorrhage, with a tremendous amount of edema around the right eye. The pulse was below 60; temperature and respirations showed nothing worthy of note. I believed death would supervene within a few hours, certainly before the expiration of two days.

The following morning the patient was answering questions more or less intelligently, and during the afternoon became thoroughly rational. There was no elevation of the temperature at any time. Two days thereafter, the only evidence that a fracture of the cranium had occurred, was the discharge of about two teaspoonfuls of spinal fluid from the right ear.

In this case there was undoubtedly a fracture extending into the petrous portion of the temporal bone (middle fossa) and also probably involving the anterior fossa. Contrary to my instructions the patient insisted upon leaving the hospital within a week. All the symptoms had disappeared, and the man said he felt perfectly well. It is my opinion that this patient will have trouble later in the form of epilepsy or other cerebral disturbance. Murphy required patients who had been rendered unconscious to remain in bed six weeks.

CASE II. In the ward the same day was another man, aged forty-four, who gave the history of having been struck on the head by a moving crane two days previously. He was rendered unconscious, and for some unknown reason was taken to the county jail, where I understand he was allowed to remain in an unconscious state for forty-eight hours before being sent to the hospital. However, this is questionable. When I saw the patient consciousness had returned. Examination revealed a superficial abrasion over the left parietal eminence which had then partially healed. So far as could be ascertained the man was perfectly normal with the exception that he was totally deaf in his left ear.

The patient was placed in bed for further observation, as there seemed no necessity for immediate operation. The next morning he said that he had passed a very uncomfortable night; that he could not sleep, and a severe headache had developed. The second day headache was more violent, and ¼ grain morphine hypodermatically failed to afford relief. The third day headache had become so intense that, although the patient had no other manifestations—no pupillary symptoms, paralysis nor anything indicative of cranial fracture excepting headache and left ear deafness—I decided to operate upon him without further delay. His temperature had gradually risen to 102° F., pulse 100. The operation revealed a linear fracture, which extended downward into the petrous portion of the temporal bone; the middle meningeal artery was completely torn across and had to be ligated; hemorrhage had not been very extensive. The bulging dura did not pulsate, and, when incised, a tremendous amount of edema was found, but there was present no blood clot. Two drains were introduced, one just above the ear, the other near the upper angle of the wound, where some trouble was experienced in controlling hemorrhage from the bone.

The morning after the operation the patient's pulse and temperature had declined to normal, and have remained so since. He slept well the first night after the operation, and remarked that "it was the best night he had spent since coming to the hospital"; and his wife said that he seemed more normal than at any time since the accident. The operation was performed seven days ago; the drains have been removed; the wound is healing normally; the patient's physical condition has improved, and he wants to leave the hospital.

Murphy recently suggested a method for arresting hemorrhage from the middle meningeal artery, which seems a most logical procedure. He says that in cranial fracture with injury to the middle meningeal, hemorrhage can be arrested by simply ligat-

ing the external carotid, the middle meningeal being a branch of the external carotid.

CASE III. A male, aged forty, was delirious or crazy when admitted and soon afterward apparently attempted suicide by butting his head against the wall. The diagnosis of cranial fracture had been made before the patient came under my observation, but the correctness of this opinion seems open to question. Of course it is very easy to say that a patient has a fracture of the skull, then let the blame for not operating fall upon the surgeon who says he has not.

This patient was admitted with the history that he had fallen from a window and sustained a head injury; he became so violent that he had to be restrained in the psychopathic department for two days; when removed to the surgical ward he again became violent, and by his own acts when unobserved the wound originally produced by the fall was reopened. Roëntgenoscopy could not be employed because the man was in such mental condition that he could not be kept quiet for a sufficient length of time. The diagnosis is still uncertain, and under all the circumstances immediate operative intervention seems inadvisable.

Of the two cases of cranial fracture reported, one was operated upon four days after infliction of the trauma and recovered. The other was not operated upon and also apparently recovered. How the patient in Case 1 happened to recover I do not know, unless it be there was absence of cerebral laceration. It was thought the patient would certainly die in a short time, and extensive basal fracture appeared so evident that röentgenoscopic investigation was not instituted, which of course is now regretted.

In Case 2 three *x*-ray plates were made, but the report from the laboratory stated that no fracture could be demonstrated. Operation revealed a linear fracture without any depression. When the severe headache developed, it was thought considerable intra-cranial hemorrhage had occurred. The fact that the dura did not pulsate was sufficient justification for its incision. When the dura is tense and non-pulsating, a decompression operation without dural incision is usually unproductive of benefit.

The patient in Case 3 is still under observation. The scalp wound has entirely healed; his mental status is gradually improving under treatment, and the uncertainty in diagnosis will be clarified by employment of the *x*-ray and fluoroscope so soon as his condition will permit.

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THE VALUE OF THE X-RAY AS AN AID IN THE DIAGNOSIS OF URINARY CALCULI.*

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The experimental stage of the Roentgen ray as a means of diagnosis has passed, and day by day it is coming into its own as the crowning achievement of progressive medicine of the nineteenth century.

In considering the indications for *x*-ray examination of the urinary tract the discomfitting fact is that a severe lesion is often present when it is least suspected; the result being that frequently we do not know when it is necessary and when it is not necessary to resort to every means at our command in an attempt to arrive at accurate conclusions.

Bransford Lewis, in an article on "Kidney Stones," says: "In the first place put no faith in symptoms, put your trust in reliable returns given by searching physical examination, including modern methods of internal inspection and investigation." He further says that "Identification of pus or infection in either kidney commonly indicates the application of *x*-ray photography to that side with or without the coincident use of radiograph ureteral catheters, or collargol injection for further elucidation."

Squier, of New York, says: "The so-called classic symptoms of renal calculus—hematuria, renal colic, and fixed pain—are so often absent as to be a negligible factor in arriving at an early diagnosis. More minor symptoms must attract us to the kidney as a possible seat of disease."

Squier quotes L. G. Cole as follows: "Most of the cases in which renal calculi have been demonstrated by the *x*-ray have had no symptoms that were sufficiently characteristic to justify an operation, and only those that engage in the ureter, or obstruct the pelvis cause typical renal colic."

Squier, commenting on Cole's statement, says: "Such being the case, a patient complaining of slight pain in the back, tenderness over the kidney, a sense of weight in the back, which is increased by jolting, or the presence of even a trace of albumen, should suggest suspicion of a calculous disease and be given the benefit of a complete routine examination of the urinary tract."

Hyman, of Mt. Sinai Hospital, New York, says: "The information obtained by careful history, physical and urinary examination may be of an entirely negative character and still serious disease be pres-

*Read before the Chattahoochie Valley Medical and Surgical Association, July 12, 1916.

ent. It is not generally recognized that stones may remain latent in the kidney for a long time, reaching a large size, and even destroying the parenchyma without producing focalizing symptoms. According to Cabot pain is absent in about 10 per cent. of the cases of renal calculus. Renal colic is present in about 50 per cent., and pain without colic in about 30 per cent."

Hyman further says: "Urinalysis gives valuable data in many of the cases, but it must be borne in mind that stones may be present with only microscopic changes in the character of the urine. Albumen, pus, and blood are present in over 80 per cent. of the cases. Stones may exist without the presence of red blood cells in the urine. It will thus be seen from this cursory review that unless more specific means for diagnosis are adapted many cases of renal calculus will be overlooked or mistaken for other conditions, and consequently many patients subjected to needless operations. Failure to take proper cognizance of these facts will still lead many to treat renal calculus for lumbago, sciatica, cholecystitis, appendicitis, and other conditions."

Statements such as I have quoted coming from men of recognized ability bring us face to face with the conclusion that many kidney cases are going on to disastrous results, which might be relieved if we were only more painstaking in our efforts to ascertain the true status of affairs in their incipiency.

Sequence of examination.—As suggested by Hyman in the examination of a suspected urological case, "it is advisable to carry out the different steps of the examination in their proper sequence. By so doing considerable time is saved, and unnecessary re-examination will often be avoided. For example, it would be unwise to cystoscope a patient before resorting to roentgenography; for should the latter demand a pyelogram or ueterogram for confirmation, it would entail a second cystoscopic examination; cystoscopy, ureteral catheterization, and uretero-pyelography could all have been combined at one sitting."

Relative value of examination.—Drs. Shropshire and Watterson, of Birmingham, in a recent article state: "The cystoscopic examination and functional test, together with careful urinalysis, is by far the most important. Next would come the radiographic examination, and then would be placed in line the physical findings and the patient's history."

Lilienthal, of New York, who reverses the order of relative value, says: "After radiography comes the cystoscopic examination of the ureters and kidneys. This sequence, radiography first and cystoscopy afterwards, should be strictly observed because cystoscopy is apt to be attended with greater inconvenience, not to say danger to the patient, than modern examination with the *x*-ray."

Hyman says: "Roentgenography, cystoscopy and ureteral catheterization, and pyelography are indispensable diagnostic agents in the examination for renal calculus. Of the three roentgenography is the most valuable procedure." He further says: "The roentgen rays will demonstrate the presence of renal calculus in probably 98 per cent. of the cases."

Thompson Walker has recently stated: "In an aseptic case the absence of a stone shadow, after two or more examinations when a plate of the first quality has been obtained, excludes all but a pure uric acid calculus. When the urine is alkaline the absence of a stone shadow excludes a calculus of any composition, for it is certain that phosphates will have been deposited upon a uric acid calculus and render it opaque to the roentgen ray."

Carman quotes Fenwick as saying: "One of the most distressing of failures in urinary surgery is to cut into a kidney and mutilate it, perhaps irreparably, in order to find a stone which has long left that organ and traveled down the ureter; and yet this must happen in at least 22 per cent. of all cases of renal stones if the *x*-ray expert is not called upon to help in the diagnosis."

As to the relative value of the cystoscopic and radiographic examinations, my own opinion is that they are equally indispensable; and because of the valuable information that can be derived from both procedures, although frequently of an entirely different character, I would hesitate to give either precedence.

I think that urologic diagnosis would be seriously crippled if either were eliminated, and that its future is materially dependent upon the proper correlation of both methods.

Advantages of the method.—(1) It is painless. (2) it gives the location, size, and number of stones. (3) It may show other pathological conditions not suspected. (4) It gives an idea of the condition of the opposite kidney and ureter, especially if used in conjunction with pyelography. (5) Frequently pain is referred to the opposite kidney or ureter, and the lesion will be found in the supposedly sound organ.

Disadvantages.—(1) It is more or less expensive depending largely upon the number of plates made. (2) It is not infallible. (3) It is not always accessible. (4) A severe lesion of the opposite kidney may be present and give no radiographic evi-

dence, therefore it is not to be relied upon to the exclusion of other methods.

Possible causes of errors.—(1) Shadows cast by opaque bodies in the intestinal tract. This error can be avoided by administering a vegetable laxative the day before the examination. (2) The heavy shadows due to gas in the colon may obscure the light kidney outlines, or soft calculi. This source of error may also be eliminated by proper purgation and administration of enemas. (3) Imperfect technic and defective plates. It is essential that the emulsion on the plates be even and without spots; and that the developed plate shows clearly the vertebral column with its transverse processes, the last two ribs, the outer border of the psoas muscle, and the bony structures of the pelvis. (4) Phleboliths, gallstones, foreign bodies in the appendix, cheesy deposits in the calices of the kidney due to tuberculosis, papillomata and warts on the skin, calcified costal cartilages, etc., may cast shadows which will require differential diagnosis. Aside from their physical characteristics, with rare exceptions such shadows can be differentiated from those cast by renal or ureteral calculi by showing their relation to the opaque catheter, or the injected ureter and pelvis. (5) Occasionally in an unusually large or fleshy person a negative finding will be made when a stone is present. (6) In case of uric acid stones, no shadow may be present on the radiographic plate.

Interpretation of the plate.—In order to more accurately localize the position of shadows, Harry Fenwick divides the loin space into two divisions by a vertical line extending from the crest of the ilium to the ribs. This is known as the mid-vertical line, and Fenwick formulates the following axioms: (1) Shadows outside the mid-vertical line are usually cast by contents of the bowel. (2) Shadows inside the mid-vertical line are usually urinary shadows, or rarely cretaceous gland shadows. (3) Shadows arranged along the mid-vertical line or near it are not infrequently collections of stones in the cortical portion of the kidney.

If the results are positive a confirmatory examination should be made, either with stereoscopic plates made with an injection of an opaque solution into the ureter and pelvis of the kidney, or with an opaque catheter in situ.

If the shadow is in the lumen of the ureter or pelvis of the kidney it will be obliterated or obscured in the pyelogram. If it is extra-ureteral or extra-renal its position with reference to the shadow of the injected ureter and pelvis will be shown.

In ureteral and vesical caluculi a considerably higher per cent. of failures is recorded from the radiographic examination.

Stewart quotes Braasch and Moore, of the Mayo Clinic, as saying, "It is doubtful if an accurate diagnosis of stone in the ureter can be made from roentgenographic data alone in more than 60 per cent. of the cases." Stewart does not accept this as final and says: "In Cabot's 127 cases recently published, 8, or 6 per cent., were persistently negative. New York roentgenologists such as Caldwell, Cole, Jaches, and LeWald do not concede failures in any such high percentage. Baetjer, of John Hopkins, however, states his negative findings in positive cases amount to about 25 per cent."

Stewart further says: "While I am not in position to give accurate figures, my experience would suggest failures in about 5 per cent. of renal and ureteral calculi, and about 10 to 15 per cent. in vesical calculi."

Interpretation of shadows along the course of the ureters is much more difficult than in the region of the kidney, the reasons being that adventitious shadows are much more common, especially along the lower ureter, and that the shadow is often superimposed upon the bony structures of the pelvis. The same reasons apply to shadows in the bladder region. In addition the bladder stone often consists of pure urates, which it is difficult, if not impossible, to detect by the roentgen ray. A calculus not visible in the ordinary radiogram may occasionally be seen if the bladder be inflated before making the radiogram.

Kummel suggests the injection of an opaque silver salt into the bladder and making a radiogram the following day. His theory is that the calculus will become coated with the colloid silver, and thus project a shadow on the plate.

ABDOMINAL SURGERY

The greatest factor to be considered in lowering the death rate in this and all other forms of surgery is the surgeon. His judgment as to what cases should be operated upon and what cases should be left alone, as to the time to operate and the time to wait, and as to how much and how little should be done; the time saved in operating on the very weak and those suffering from severe shock; the care and ease used in handling the patient; the confidence instilled into the already frightened and nervous individual, and many other things that cannot be thought of all make a great difference in the death rate.—EZRA C. RICH in *Colorado Medicine.*

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WALTER M. BRICKNER, M.D., Editor

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PAIN IN THE ARM.

It is not generally appreciated, as it should be, that pain in the arm is very often, perhaps most often, a surgical affection rather than the "neuritis" or "rheumatism" for which it is usually (mis)-treated.

Brachial neuritis is a very real disease, to be sure, but it is comparatively uncommon, and the diagnosis can not be accepted unless there is distinct nerve tenderness, definite pain distribution and —if the condition has lasted long—sensory, motor or trophic disturbances.

Rheumatism without articular inflammation, i. e. so called muscular rheumatism, is an altogether untenable diagnosis if the pain is limited to one arm.

Among the less common surgical affections that may cause pain in the arm are cervical rib, localized periostitis of the scapula or humerus, and inflammatory or neoplastic lesions of one of the bones. There is an affection of the long bones which is apt to escape diagnosis and which, so far as we know, has not been described—chronic, sterile, afebrile, medullary abscess. This produces severe pain, and is marked by exquisite local bone sensitiveness. Roentgenographically the appearance is that of an osteoperiostitis, the thickened corticalis encroaching upon the medullary cavity. The pus, which produces no shadow, lies above or below the zone of thickened cortex.

By far the most common surgical lesion causing pain in the arm is subacromial (subdeltoid) bursitis. This, an affection of adult life, often appears to arise spontaneously, although it probably has its origin in some trauma—often a comparatively mild internal violence. Although pain in the shoulder is also common in this affection and there usually is, or has been, more or less—sometimes very pronounced—disability of shoulder function, these are not constant symptoms. Nor, usually, is there any local swelling or other deformity about the shoulder. The most constant symptom is pain in the outer or anterior aspect of the arm. When this pain extends into the forearm or even the hand it is very apt to be mistaken for that of neuritis, especially if there is an associated atrophy of the deltoid and the spinati. In many, but by no means all cases, of subdeltoid bursitis, a roentgenogram will reveal the tell-tale subbursal lime deposit concerning which there have been so many mistaken notions. This lime deposit, for the production of which we may yet find some predisposing metabolic fault, appears to us to be also traumatic in origin, arising from an injury to the supraspinatus (occasionally the infraspinatus) tendon associated with trauma to the overlying tendon, as we have demonstrated surgically and histologically.

We shall not here refer at length to the diagnostic aspects of subdeltoid bursitis, elsewhere described, nor to the various other conditions that may cause pain in the arm. The purpose of this editorial is to call attention to the desirability of looking for that very common affection, and of seeking the aid of the Roentgen ray in all cases of pain in the arm.—W. M. B.

THE TRANSVERSE ABDOMINAL INCISION.

The transverse abdominal incision of Sprengel, especially as it has been modified by Perthes, seems to be growing into favor among surgeons, and deservedly so for it possesses certain distinct merits and no very serious drawback. A. V. Moschcowitz (*Annals of Surgery*, September, 1916) is the latest to extol the transverse incision in the surgery of the upper abdomen, where he has employed it in a large number of cases during the past six years.

Moschcowitz emphasized certain anatomical facts that make the transverse incision more "physiological" than the vertical. He states, quite properly, that "the sheath of the rectus" should not be regarded merely as a sheath but as the aponeurotic expansions of the external and internal oblique and the transversalis muscles; and, since the pull of these muscles is lateral it is more physiological to incise their aponeuroses transversely than longitudinally. Theoretically this is true but, in fact,

the fibers (or "little tendons," as Moschowitz calls them) of these aponeuroses are not disposed transversely alone, but decussate at various angles of obliquity; and *when these aponeuroses are divided transversely they gape even more than when the incision is vertical* (*longitudinal.*) Moreover, if it is physiological to incise these aponeuroses transversely it is certainly unphysiological to divide the rectus muscle transversely.

All those who have advised the transverse incision have based its merit in part upon the transverse disposition within the rectus sheath of the intercostal nerves (supplying the rectus and peritoneum) which, therefore, are liable to injury by a long vertical incision. Usually these nerves can be drawn aside; and if one or even two of them are cut or torn in a long rectus-splitting incision this produces no ill-effect, so far as we have been able to note.

The greatest disadvantage of the transverse approach is that it takes much longer to execute than the vertical, since it requires the placing of two rows of fixation sutures to control the vessels in, and prevent the retraction of, the rectus. To balance this admitted drawback Moschcowitz tells us that though it takes longer "to get in" it is much easier "to get out" with the transverse incision. Admittedly it is sometimes extremely difficult to suture the peritoneum in a vertical incision if the patient is obese or is straining. Then the peritoneum is apt to tear at the sutures, leaving gaps that needs must cause omental or other attachments and adhesions. All abdominal surgeons are familiar with the time-consuming difficulties that present in such cases—difficulties that are not encountered with the transverse division. But we must remind Moschcowitz that although with the transverse incision it *always* takes long "to get in," with the vertical incision it only *sometimes* takes long "to get out."

Cosmetically, the transverse incision has the advantage; it leaves a much less conspicuous scar.

The exposure secured by the transverse incision is quite satisfactory, especially if it is carried as far beyond one rectus in either direction as may be needed. It is therefore useful for operations upon the stomach, the colon, the pancreas. To reach above or below it requires much the same retraction as the vertical incision requires to reach tissues to one or the other side. For cholecystectomies we still incline to prefer the vertical incision. It affords at least as good exposure of the common bile duct and, if carried up to the costal border itself, it allows eversion of the gall-bladder and much of the liver, an important aid in the operation which, necessarily, the transverse incision scarcely permits. Nor have we ever found it necessary to add to the vertical incision cross curved or oblique cut for any operation on the bile passages. For large tumors of the bowel occupying the loin, the transverse incision, liberally extended, is very acceptable.

When all is said and done, almost any intraabdominal operation can be performed through either a vertical or a transverse incision. Either can be made to give adequate exposure.

The "physiological" considerations are, as we have pointed out, theoretical rather than practical. Properly sutured and healed *per primam*, the abdominal wall is restored without loss of substance or function whether it is divided longitudinally or transversely.

It seems to us that neither mode of approach should be adopted as a routine to the exclusion of the other. Both are good; and the surgeon should be facile with both and should employ now one, now the other, as the individual case may suggest. —W. M. B.

ANNOUNCEMENT.

SPECIAL ISSUE DEVOTED TO OBSTETRICS AND GYNECOLOGY.

The November issue of THE JOURNAL will be a special number devoted exclusively to Obstetrics and Gynecology. It will contain many interesting articles by prominent specialists, most of them written for this issue.

Surgical Suggestions

Portal vein thrombosis is probably not always fatal. Occasionally patients with all the classical signs and symptoms of suppurative pylephlebitis spontaneously recover.

The healing of pus pockets and suppurating sinuses after appendicitis is facilitated by cleansing them daily with injections of hydrogen peroxide; but this, of course, should not be undertaken until the sinus or pocket is surrounded by a solid wall of granulations.

A yellow or yellow-gray membrane appearing in a wound should be carefully investigated. It may be a diphtheria infection which, though rare, should always be thought of. It is advisable to administer large doses of antitoxin without waiting for laboratory confirmation of the diagnosis for, unless quickly dealt with, such an infection is usually soon fatal.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

Pay Clinics.

The extension of clinical facilities for paying patients is at present agitating the minds of many interested in medical economics. Under various plans proposed, ambulant patients of moderate means, who are not entitled to free dispensary treatment under ordinary circumstances, are to have the opportunity of consulting specialists, whose office fees are beyond their means. In most instances, this type of clinic is restricted to those whose annual income is $1,200 per annum or less.

While there are fears that a clinic of this character actually competes with the family practitioner, the experiences in Boston, Brooklyn, and Cleveland indicate that pay clinics undermine quackery, reduce drug store medication, afford better service to patients, and actually yield scientific possibilities advantageous to the general practitioner endeavoring to make proper diagnoses upon patients unable to afford the special investigations or specific diagnostic services.

In connection with this plan, there is the admirable principle of remuneration for the physicians, specialists or otherwise, whose services are being utilized in the extension of the project. Moderate charges are made for *x*-ray work and for unusual laboratory investigations. The earnings of such dispensaries are in some instances divided between the dispensary and the workers. In some institutions the workers receive a definite nightly compensation for a definite period of time of service.

With reference to the legality of pay clinics, as violating the proper interpretation of dispensary use, a recent decision by the Attorney-General of New York State is quite noteworthy. Inasmuch as dispensaries have been classed as charitable institutions, their abuse has been the subject of considerable comment and discontent. To establish, therefore, in a dispensary a pay clinic would at first thought appear to be a violation of the spirit in which such institutions were organized for the benefit of the public.

The Attorney-General unhesitatingly states that a charge in itself would be lawful. "Whether a person who pays one dollar for treatment at such a dispensary is a proper object for charity, depends entirely upon the circumstances in each individual case. If all that patient can afford to pay is one dollar, and he may obtain treatment by a specialist for that amount at a dispensary, while treatment by the same specialist at the patient's home or the physician's office would be entirely above his means, I do not see why such patient cannot avail himself of the services of such specialist."

He further expresses himself as of the belief that dispensaries of this type should be "encouraged and assisted rather than hampered and hindered."

This opinion is one of the first utterances on the legal aspects of pay clinics. The problem now exists of satisfying the profession of the justice of pay clinics and of convincing them that such institutions do not tend to undermine the sources of private practice.

A theoretic judgment upon a matter of this kind is naturally prejudiced by one's own relations to medical practice. To the man approaching the subject with an open mind, it becomes necessary to investigate the facts as thus far developed in cities where pay clinics have already been instituted. An analysis of the results thus far obtained suffices to show that many of the fears are groundless and that the advantage to be derived by both physicians and patients far outweigh any disadvantages which would seem to exist on theoretic grounds. There is every reason to believe that pay institutions are to become more numerous and will occupy a prominent place in the development of dispensary systems.

There lies a latent danger in arbitrary decisions on the part of institutions, wherefore it becomes essential that dispensary workers have every opportunity to co-operate in working out the basis of pay clinics and establishing the rules and regulations and in developing the policies which are to be pursued. Only by united efforts of those vitally interested in the question is a rational plan to evolve which will satisfy the medical profession and yield the most fruitful results to society. The social advantages to the pay clinic are inestimable and the benefits to the general practitioner may be of little less value.

Experience has shown that there is reason in going slowly in instituting paid dispensary service. The first clinics developed merely took care of such specialties as venereal diseases or eye diseases. The great number of general clinics existing manifest the importance of other specialties equally important to the great middle class public, which are equally entitled to consideration in the development of out-patient departments.

The economic basis of practice is the charge made to the well-to-do and on this basis has been justified the vast amount of gratuitous service given

by physicians to the poor, in addition, of course, to the actual personal return secured by reason of experience or by the acquisition of a mass of clinical material available for teaching purposes. The largest proportion of the community, however, does not come within the delimination of the pauper class or extremely poor, but is represented by the self-respecting individuals whose insufficient margin of income does not enable them to take the advantage of the best medical service or continue to receive such service for a long period of time.

The standards of medical service today are higher than ever. The growth of the habit of consultation is indicative of the importance placed upon accurate diagnosis and improved methods of treatment. The extent to which the general public is capable of taking advantage of these two factors in modern medicine is restricted because of economic pressure. This is the idea which underlies the great questions of health insurance, accident insurance, workingmen's compensation acts, employers' liability acts, and similar movements for social insurance.

The facts are undeniable and in the interests of efficient social service and social justice, it is proper to establish pay clinics to give the fullest opportunity to the bulk of the population to receive the special services which are needed at a fee which is within their means and with a distinct gain in the character of the services performed. There is naturally a suspicion on the part of many that to make a statement of this character is antagonistic to the best interests of the profession; that it is a reflection upon the nature and type of service now being offered and performed by the bulk of the physicians in the country.

It is only the exceedingly sensitive individual, who is thinking in terms of money rather than in degrees of service, who does not properly inventory the shortcomings of the profession. It is no disgrace to recognize weaknesses for the purpose of developing strength. It is no crime to criticise conditions arising from economic forces with a desire to placing greater facilities at the disposal of the profession. How many physicians actually own microscopes, possess an X-ray outfit, have a clinical laboratory, or the apparatus essential for the diagnosis of pathological specimens? The percentage is not sufficiently large to warrant a feeling of superiority in equipment beyond friendly criticisms, and yet, these are, today, requisites for the best types of medical and surgical service.

The surgeon has unhesitatingly criticised the standards of surgery in this country and the Fellows of the American College of Surgeons do not hesitate to demand higher standards for the practice of surgery. They would indeed limit the practice of this art to those especially trained in particularly well equipped hospitals. The underlying idea is certainly the improvement of surgical service in the interests of the general public. And this, after all, is the very basis of all our efforts to improve the standards of medical service. The pay clinic is an institution for cooperation, for team work in diagnosis and treatment, which today is possible only for those of large financial means. The same opportunities should be afforded to all and for this reason the opposition to the pay clinic must naturally succumb to the greater interests of the suffering public.

Book Reviews

Man—An Adaptive Mechanism. By George W. Crile, F.A.C.S., Professor of Surgery, School of Medicine, Western Reserve University; Visiting Surgeon to the Lakeside Hospital, Cleveland. Edited by Annette Austin, A.B. Octavo; 387 pages. New York: The MacMillan Press, 1916.

Crile has written this book upon the hypothesis that man is a mechanism, obeying the laws of physics, and that essentially this mechanism functions as an energy transformer. He elaborates this theme, pointing out that the individual is, moreover, an adaptive mechanism, dependent for its life and its death upon all the physical conditions of its environment. As new life comes into contact with existing life, the varied stimuli of the world create in the plastic brain of the new-born babe a great number of "action patterus," each the projected brain impression of action executed during a wakeful moment. Furthermore, energy transformation produces "acid by-products." These by-products are neutralized by the respiratory, adrenal, and liver systems—as measured by the H-ion concentration of the blood. The H-ion concentration affects the stimulation or inhibition of the higher brain centers, which, in turn, drive the kinetic system of man. In this way the cycle is completed.

During sleep this train of phenomena is altered. The brain is spared shocks (and acid productions) since no stimuli by contact or "distance ceptors" reach it. Crile argues, therefore, in anociation he simulates for man the conditions of sleep in that he isolates the brain by dulling pre-operative sensibility, by blocking the "distance ceptors" with general anesthesia, and by blocking afferent nerve paths with local agents.

Treatise on Fractures. By John B. Roberts, A.M., M.D., F.A.C.S., Professor of Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; and James A. Kelly, A.M., M.D., Attending Surgeon to St. Joseph's, St. Mary's, and St. Timothy's Hospitals, Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine. Octavo; 677 pages; 909 illustrations. Philadelphia and London: J. B. Lippincott Company, 1916. Price, $6.00.

The purpose of the authors is to present a clear view of the entire subject of fractures, particularly in the light of recent discoveries, and to emphasize accurate scientific procedures, operative or otherwise, according to the nature of each injury.

The first chapter deals with the general aspect of the

subject, considering the etiology, symptomatology, and treatment of all the various types of fracture. The successive chapters take up the fracture-injuries of each bone, adequately illustrating all the essential points involved in the consideration of each subject. Vertebral fractures are specially well presented; the photographs of the zones of anesthesia produced by the respective vertebral lesions are accurate, valuable, and striking. Each extremity is discussed separately, also the skull, thorax, etc. A short but valuable chapter on child fractures and another on gunshot fractures complete the book.

The volume is well planned, well written; the text is clear, the accompanying illustrations are very good. The book should prove of value to the student and practitioner.

Maladies des Organes Génitaux de l'Homme. By Pierre Sebileau and Pierre Descomps, Professors of the Faculty of Medicine, Paris; Surgeons to the Lariboisière and Paris Hospitals. Octavo; 675 pages; 150 illustrations. Paris: T. B. Baillière and Sons, 1916. Price, 15 francs.

This large volume represents one of a series in a general system of surgery, other volumes of which have been here reviewed. It is an exhaustive survey of genito-urinary diseases. While there is no new point of attack in the scheme of this work, it aims to consider the disorders of each organ separately, and to bring before the reader the best of new advances in pathology and treatment. About 100 pages are devoted to a splendid consideration of testicular tumors. Operative indications are clearly presented, and technical procedures are discussed lucidly. Acute and chronic lymphangitis, gangrene of involved organs, torsion of the spermatic cord, the therapy of the tuberculous testis—these matters are treated in a thorough and scholarly manner and in a style that is fresh and clear.

Skin Cancer. By Henry H. Hazen, A.B., M.D., Professor of Dermatology in the Medical Department of Georgetown University; Professor of Dermatology in the Medical Department of Howard University, etc. Octavo; 251 pages; 97 text illustrations and one colored frontispiece. St. Louis: C. V. Mosby Co., 1916.

This is an excellent monograph upon the cancerous and pre-cancerous dermatoses. The text is didactic, systematically written, and covers every phase of the subject from pathology to treatment. Of especial interest to us is the part devoted to pathology, which, while not revealing unusual depths of learning, is satisfactory for all practical purposes. The text is interspersed with numerous references to the literature, although the personal note is everywhere dominant. The illustrations are unusually good.

Elements of Active-Principle Therapeutics. By John Marshall French, M.D. Duodecimo; 128 pages. Chicago: The Abbott Press, 1916.

This small book contains a series of lectures on the development of active-principle medication, its principles and the elements of their application. They are written with an elegance of diction and charm of style that are rare in medical literature and, quite aside from that aspect, they are interesting and illuminating.

Books Received

Physics and Chemistry for Nurses. By Amy Elizabeth Pope, Instructor in the School of Nursing, St. Luke's Hospital, San Francisco; author of "Anatomy and Physiology for Nurses," etc. Duodecimo; 441 pages; illustrated. New York and London: G. P. Putnam's Sons, 1916. $1.75.

Collected Papers of The Mayo Clinic, 1915. Edited by Mrs. M. H. Mellish. Volume VII. Octavo; 983 pages; 286 illustrations. Philadelphia and London: W. B. Saunders Co., 1916.

Progress in Surgery

A Résumé of Recent Literature.

The Treatment by Splenectomy of Splenomegaly with Anemia Associated with Syphilis. H. Z. Giffin, Rochester, Minn. *American Journal of Medical Sciences*, July, 1916.

1. It is probable that the syndrome of splenic anemia and Banti's disease may be present in a patient who has had syphilis, in whom it cannot be demonstrated that the syphilis is a definite etiological factor in the condition.

2. Cases of marked splenomegaly in which syphilitic cirrhosis of the liver, or gummata of the liver, are present, or in which repeated positive Wassermann tests together with other evidence of infection are obtained, should be separately classified and studied.

3. Because of the fact that syphilitic splenomegaly with secondary anemia has persisted in spite of active anti-syphilitic treatment, splenectomy has been done elsewhere in three recorded cases. Three additional cases of this character are herewith reported.

4. The results following splenectomy for marked splenomegaly associated with syphilis and anemia performed after a trial of antisyphilitic treatment seem to have justified the procedure in these few instances.

5. The three cases herewith recorded showed prompt improvement after splenectomy and were in excellent condition three months, eight months, and one year respectively from the date of operation.

Indications for Splenectomy in Certain Chronic Blood Disorders: The Technic of the Operation. D. C. Balfour, Rochester, Minn. *Journal American Medical Association*, Sept. 9, 1916.

Balfour says that splenectomy has already proved a curative measure in certain diseases associated with definite blood changes and has recently been advocated in other diseases that seem more or less closely related to those in which the spleen is the known causative factor. Splenic anemia affords the most familiar example of its therapeutic value. While the interdependence of the spleen and liver is not clearly understood, there is ample evidence to show that some of the most important functions of the liver are more or less controlled by the spleen, and during the last two years, with this theory as a basis, selected patients with primary hepatic cirrhosis have been splenectomized. Balfour and others have seen good results follow splenectomy in three cases of syphilitic spleen. It may be assumed from the facts that the spleen picks up the spirochetes and harbors them, and its removal, followed by specific treatment, causes prompt and permanent relief. The use of splenectomy in pernicious anemia is on trial and the final decision as to its value cannot be stated. The larger the spleen, it would seem, the better the prospects of good from splenectomy in diseases in which it is indicated. A marked icteric discoloration of the skin in pernicious anemia may be taken as an indication that the spleen is to a large extent responsible. Blood transfusion in small quantities at frequent intervals has been recognized as a valuable treatment, though giving only temporary relief in pernicious anemia. It has recently become evident that it is also of distinct prognostic value. Definite improvement after transfusion is a strong indication for splenectomy, and no improvement, the reverse. At Rochester splenectomy has been found of less technical difficulty in pernicious anemia than in any other disease. An abdominal exploration should first be made after the incision in view of the frequent complications of liver and gall-bladder. The dislocation of the spleen is not as a rule complicated by formidable adhesions. In certain cases the tip of the pancreas must be dislodged from its position if the pedicle is to be ligated without injury if it rests in the hilus of the spleen. It is rarely of sufficient size to present difficulties. It is comparatively easy to isolate the arteries and veins and ligate them separately. After all bleeding points have been controlled, the pack is removed

and the diaphragmatic surface inspected. They believe that splenectomy should be considered in every case of pernicious anemia with established diagnosis after all possible etiologic factors which might be independently remedied have been excluded. The failure of other means, the previous fatal prognosis, and low operative mortality are strong arguments in favor of splenectomy, and contraindications must be positive and adequate. Granting this, however, our imperfect knowledge makes caution advisable and a conservative selection of cases should be made.

Splenectomy for Hemolytic Jaundice. C. H. PECK, New York. *Journal American Medical Association,* Sept. 9, 1916.

The first case, in a young woman 30 years of age, was of the congenital nonfamiliar type and was the first patient in this country on whom splenectomy was performed for hemolytic jaundice. It was first noticed when she was 3 days old and existed in mild degree with no other symptoms until she was about 21, when she first had an attack of deepening of the color. This has been followed by other similar attacks, without other symptoms than a general tendency to intensification. She has never had itching, slowing of the pulse, or any other symptoms of ordinary obstructive jaundice. In 1907, a cholecystostomy was performed in Baltimore, but no gallstones or other lesions were found and the jaundice returned and persisted as soon as the biliary fistula healed. Two and one-half years later she was admitted to the Johns Hopkins Hospital, and a diagnosis of congenital hemolytic jaundice was made by Thayer, who did not advise operation. Her red cell fragility was the same as noted by Peck, three years later. In 1911 she entered a hospital in New York on three separate occasions, but no operation was done. The jaundice so preyed on her mind, however, that she came to the Roosevelt Hospital again in 1912, and an examination was made and a little later an exploratory opertion was done. There were no adhesions and the operation was well borne. Diminution in the jaundice was noted after the third day, and by the tenth day she was entirely free from jaundice for the first time in her life. The striking features of the case were the marked fragility of the red cells and their prompt return to normal after splenectomy, a result which has been by no means uniform in the reported cases. Another was a rather checkered medical experience and the fact that her treatment coincided with the developmental stage of our knowledge of the condition. In the second case the red cell fragility was less marked and it was of the acquired type. Splenomegaly was pronounced, the spleen weighing 800 gm. The jaundice disappeared, as in the other case, after operation, but the fragility remained. The third case mentioned was operated by Dr. J. I. Russell, who permits Peck to include it in his report. The results were equally good, though the patient had been jaundiced since birth. That hemolytic jaundice is not uncommon, and that it can be cured by splenectomy, are facts now well recognized, Peck says, and recent additions to the literature are emphasizing the importance of these facts.

Relief of Chronic Obstructive Jaundice by Palliative Operations. J. F. ERDMANN and C. G. HEYD, New York. *American Journal of Medical Sciences,* August, 1916.

Conclusions: 1. All cases of obstructive jaundice are entitled to operative consideration. There is a certain definite percentage of cases that are cured because there has been a mistake in the diagnosis.

2. Operations are not prohibitive considering the severity of the disease and its hopeless outlook.

3. The immediate relief from itching, in addition to the prolongation of life, is an exceptionally strong argument for operation.

4. Operation obviates the development of "pressure pain" from increasing distention of the biliary apparatus.

5. These operations are advised solely as palliative procedures and as such their purpose must be clearly understood.

Some Observations on Congenital and Acquired Hemolytic Icterus: With a Report of Two Cases Treated by Splenectomy. G. E. BREWER, New York. *Medical Record,* July 1, 1916.

After an excellent résumé of this rare condition, Brewer reports two cases in which the jaundice was entirely relieved and the physical condition was considerably improved after splenectomy. He regards early splenectomy as a comparatively safe and the only successful method yet suggested to cure this condition.

The Radical Treatment of Gastric Ulcer. J. CUNNING, London. *Lancet,* July 22, 1916.

Cunning is convinced that gastro-jejunostomy is unsatisfactory as a cure for gastric ulcer and may even add to the discomforts of the patient. He holds that all gastric ulcers can be excised except those adherent to important structures, and gastro-jejunostomy is useless for these. In such instances, the stomach can be detached from the base of the ulcer, the opening closed, and the base of the ulcer, after being scraped, is excluded from the stomach.

Observations on the Occurrence of Syphilis in the University of Michigan Obstetric and Gynecologic Clinic. REUBEN PETERSON, *Surgery, Gynecology and Obstetrics,* September, 1916.

Out of 2,000 patients in the University hospital, excluding the syphilological and neurological services, the proportion of syphilitics was 6 per cent. There were 381 obstetric patients with 18 luetics, or 4.7 per cent.; 390 gynecological cases with 22 luetics, or 5.6 per cent. The diagnosis was made by Wasserman reaction and expert physical examination. Of the 18 obstetric luetics, only 8 gave a history of lues. In these 8 cases there was positive clinical evidence of lues. The possibility of a full-term living healthy child in syphilitic mothers is greatly enhanced by treatment with salvarsan and mercury. The new-born infants of the mothers, so treated, do not give positive Wassermann reactions, although undoubtedly they are syphilitic and later probably will show signs of the disease. A certain proportion of the new-born children of untreated syphilitic mothers will give positive Wassermann tests. Only by routine Wassermann tests will the obstetrician and gynecologist best serve the interests of his patients. Especially is this true in hospital practice, where even careful histories fail to arouse suspicion of latent syphilis.

Epiploitis Following Herniotomy. WILLIAM HESSERT, *Surgery, Gynecology and Obstetrics,* September, 1916.

The majority of cases in which epiploitis follows a herniotomy run a subacute or chronic course lasting for months or even years. The free interval after operation is generally of four to eight weeks' duration, but cases are on record in which two or three years elapsed before the onset of symptoms. Pain is one of the first and most constant symptoms. Frequently it is in the upper part of the abdomen and is aggravated by deep breathing, coughing or tight clothing. Fever may be and usually is associated with the pain, but as a rule subsides with spontaneous recovery. Suppuration occurs in some cases and the epiploitis may then simulate acute lesions referable to abdominal viscera. The slow chronic form of epiploitis may simulate carcinoma and even at laparotomy doubt may be expressed concerning the character of the mass, appearing like a carcinoma or sarcoma. The tumor is usually on the same side as the herniotomy, on a level with or above the umbilicus. It is usually easily palpable, being attached to the abdominal wall and does not move with respiration.

Hessert advises against rough handling of the omentum and of ligation en masse. He prefers to use fine absorbable ligatures for the vessels themselves.

Operative interference is not always necessary, as a fair proportion of cases recovers under expectant treatment. When an exploration is indicated the inflammatory mass should be excised completely. If this is not feasible on account of adhesions and abscess formation, thorough drainage should be established.

Thoracic Diseases: The Status of Surgical Therapy. S. ROBINSON, Rochester, Minn. *Journal American Medical Association*, Aug. 19, 1916.

Robinson treats the surgery of thoracic diseases, which he considers to be at present in a rather chaotic condition. He says no region in the body demands the combined efforts of the physician and surgeon more than the pleural cavity. Lesions in the thorax are not as amenable to treatment by surgical means as those of the abdomen. It is a more perilous quarter to work in. He advises consultations in cases of postpneumonic abscess so as to aid in determining the point at which spontaneous recovery is doubtful and the operative risk begins to increase. Here the surgeon of the thorax can be of value to his medical brother. In chronic lung abscesses they are less successful, and would welcome the exclusion of this class of cases from the surgical field. They believe that early compression therapy will do great good in chronic abscess cases, and they watch the work of the internist with vaccines, hygienic and climatic influences with great interest. Bronchiectasis would seem to be a chronic, incurable disease, and he ventures to suggest that the practitioner keep such patients as long as possible, but do so intelligently. In true bronchiectasis, expectorants, inhalations, cough mixtures, climatic changes and vaccines fail. Artificial pneumothorax has been reported as curative, but he has grave doubts. Do not invite or permit a surgeon to drain your case of bronchiectasis. It will do no good and possibly much harm. Let no man attempt a lobe excision in a single operation. A single lobe of the lung may be removed in a three or four stage operation which he has described elsewhere, and a small series of cases will be reported within a year. Emphysema is another stumbling block in the chronic, pathologic conditions. The only surgical operation we can offer is the removal of several costal cartilages, which will relieve rigidity but does not cure. Heart and kidney complications and suppurative bronchitis are contraindications. Much reduced expansion is the *sine qua non* of indications. It may be justly said that the methods of exploring the pleural cavity are inadequate, and these as well as other surgical errors should be known, but surgery properly and persistently applied is the best if not the only means of cure. In the management of tuberculosis, the practitioner has ceased to look to the surgeon for help. Drainage of tuberculous cavities is not regarded as a profitable surgical measure. At present the only justifiable mechanical procedure in pulmonary tuberculosis is collapsing the lung by the introduction of nitrogen or fluid into the pleural cavity. This treatment is properly carried on by the internists. Robinson speaks of cold abscesses, which he thinks should be treated as primarily cases of tuberculous pleurisy. The use of the Roentgen ray is advised in swellings on the chest wall, and it can reveal the two types at least that are curable. Removal of malignant tumors, if early localized, is surgically possible, but we cannot expect the internist to diagnose such tumors at their early stage. There is a backwardness, Robinson thinks, in surgeons in utilizing exploratory thoracotomy.

Intradural Nerve Anastomosis in Selected Cases of Poliomyelitis Paralysis: Preliminary Report. NORMON SHARPE, New York. *New York Medical Journal*, July 1, 1916.

The experiments of Kilvington, Frazier and Mills and the author have shown that nerve anastomosis within the spinal canal is feasible and successful. Sharpe reports three cases of paralysis of one of the lower extremities due to poliomyelitis in which he performed intradural anastomosis, suturing the dead anterior root to a "live" root. The "live" roots were either the 12th dorsal or first and second lumbar roots which supply muscles of the trunk having other nerve supply. The operations were done in two stages, but Sharpe believes that with improvement in technic the operation could be done in one session. The operations were too recent to permit of definite conclusions being drawn. The subsequent histories will be published later.

Transverse Incisions in the Upper Abdomen. ALEXIS V. MOSCHCOWITZ, New York. *Annals of Surgery*, September, 1916.

Moschcowitz's attention to the value of transverse incisions was called by Sprengel's work, which appeared in the *Archiv f. Klinische Chirurgie*, vol. xcii, p. 537. Moschcowitz points out that the transverse incision is not only more practical but really preferable, since, unlike the vertical incision, it does not divide at right angles a large number of small tendon-like muscle terminations, nor will the wound have a strong tendency to pull apart wider and wider.

In the surgery of the abdominal parietes the transverse incision offers, as against the routine vertical incision, greater ease of execution, as far as "getting in" is concerned, better exposure, more ease of execution, as far as "getting out" is concerned, decided post-operative comfort, better cosmetic results, and no post-operative defects such as hernia.

The Value of the Roentgen Rays in the Diagnosis of Diseases of the Accessory Sinuses, with a New Technic for the Sphenoid. GEORGE E. PFAHLER, Philadelphia. The *Laryngoscope*, July, 1916.

The Roentgen ray has become almost a routine measure in the diagnosis of accessory sinus disease. Inasmuch as the rays record only the different densities of tissues small sinuses containing relatively little air will give denser shadows than larger ones. The amount of contrast depends upon the health of the surrounding bone. In diseased bone some of the lime salts have been absorbed and the sharp outlines of the sinuses will be blurred.

In the interpretation of the plates it must be remembered that structures behind the sinuses will throw shadows that may obscure the picture and render diagnosis difficult. The author's habit is to make several plates, usually six, especially placed for the different sinuses and by comparison get at his diagnosis.

The new technic for the sphenoid consists in placing films, protected from the wet, in the mouth and passing the rays at such an angle that the picture shows only he alveolar arch and within its curve the sphenoid and posterior ethmoid cells.

In conclusion Pfahler states:

1. By means of the Roentgen rays one may determine accurately the size, outline, form and general character of the accessory sinuses.

2. One can determine the presence or absence of exudate in these sinuses.

3. One cannot determine accurately the character of such exudate.

4. Tumors of the accessory sinuses may be definitely diagnosed, and their extent of distribution determined.

Radium Treatment of Uterine Cancers. JOSEPH RANSOHOFF, Cincinnati. *Annals of Surgery*, September, 1916.

The radical removal of the uterus for cancer carries with it so high a mortality that the possible value of radium treatment for this condition deserves further consideration. Dominici's discovery of the usefulness of ultra-penetrating gamma rays opens up a wide field for hopeful study.

Within one to three weeks after radiation no case failed to have arrested its offensive discharge and hemorrhage. Cauliflower vegetations, which often fill the vagina, melted away; the patient's general condition improved amazingly.

The authors radiated 25 cases; of these 11 are still well (3 operable and 8 inoperable cases). They hold that radium is the method of choice in the treatment of inoperable and borderline cases. They emphasize the great importance of not subjecting to hysterectomy cases previously radiated because operation would be difficult and dangerous.